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# The AUTOMOBILE

VOL. XXXVI

NEW YORK—THURSDAY, MAY 31, 1917—CHICAGO

No. 22

## To Abandon 5% Tax

Revenue from Automobile Manufacturers by This Means Declared Unsound Business and Prejudicial to Good of Country

Senate Finance Committee May Substitute Tax on Owners' Cars, Ranging from \$2 to \$25 Per Year

WASHINGTON, D. C., May 28—The 5 per cent war revenue tax to be paid by automobile manufacturers on all automobiles sold by them has been finally abandoned as unsound business and prejudicial to the general good of the country. This action has been taken by the Senate Finance Committee, which has practically decided to re-write the entire war revenue bill as originally proposed by the Ways and Means Committee of Congress. It was expected that the Senate Finance Committee would not be satisfied with the measure as passed in the House. This committee began its work by having hearings on the 5 per cent tax at which many representatives of the automobile industry were present.

### Must Continue Fight

Alfred Reeves, general manager of the N. A. C. C., is still spending all of his time in Washington, and considers the situation materially improved, but that the automobile industry is still a long way from final action in the matter and that the activities of the different factories must not cease. Mr. Reeves believes that the Senate Finance committee has been favorably impressed with the fact that a tax on gross business, whether on automobiles or anything else, should be eliminated. In place of the 5 per cent tax on automobile manufacturers there is a proposition under consideration by the Senate Finance Committee to place

a tax on automobiles in the hands of owners, but not on motor trucks. It was suggested that this owners' automobile tax would range from \$2 to \$25 per year, depending on the size of the machine. This tax would be in addition to State registrations at present in force. It is not known exactly how such a tax could be imposed, as heretofore it has been considered unconstitutional for the Government to levy such a war tax in addition to present State registration taxes, etc.

Senator Ollie M. James of Kentucky, of the Senate Finance Committee, stated in answer to a query as to what extent automobile owners would be taxed under the Senate bill to be drafted, stated that no decision had been reached on the question and that none would come before next week. Senator James is positive that it has been definitely decided, however, to eliminate the 5 per cent tax, and that in re-adjusting the tax from the manufacturer to the car owner it was expected to raise approximately as much money as the former bill had expected to raise from the manufacturers under the 5 per cent tax.

Senator James stated further, however, that the Senate Finance Committee had referred this matter of the owners' tax to Secretary of the Treasury W. G. McAdoo for an estimate of the amount of money the Treasury thinks should be raised in this way. Any definite action of the Sen-

ate Finance Committee as to the rate of tax will depend on the recommendations from Secretary McAdoo, who favors taxing the automobile owner direct.

It is expected that the Senate Finance Committee will frame a tax upon advertising in all its forms to produce an estimated income of \$15,000,000.

### Owners Can Bear Tax

The individual members of the Senate Finance Committee are of the opinion that individual automobile owners throughout the country will not oppose a tax ranging from \$2 to \$25 per car. Before such a tax can be decided upon the bill must be introduced in the Senate.

The Finance Committee of the Senate which is drafting the new measure follows:

Furnifold McL. Simmons, North Carolina, chairman; William J. Stone, Missouri; John Sharp Williams, Mississippi; Hoke Smith, Georgia; Charles S. Thomas, Colorado; Ollie M. James, Kentucky; William Hughes, New Jersey; Thomas P. Gore, Oklahoma; Andrieus A. Jones, New Mexico; Peter G. Gerry, Rhode Island; Boies Penrose, Pennsylvania; Henry Cabot Lodge, Massachusetts; Porter J. McCumber, North Dakota; Reed Smoot, Utah; Jacob H. Gallinger, New Hampshire; Robert M. La Follette, Wisconsin; Charles E. Townsend, Michigan.



## No Action on Tax Substitute

### Rubber Assn. Suggests 5% on Manufactures Instead of 10 % on Crude

WASHINGTON, D. C., May 29—Nothing definite has come from the Senate Finance Committee as to the substitute method for raising war taxation suggested by the Rubber Assn. of America on May 5. The original war revenue tax bill included a 5 per cent tax on automobile tires and tubes. There was an additional rubber tax of 10 per cent import duty on crude. Previously crude rubber was on the free list. The Rubber Assn. believes that taxing crude rubber, all of which has to be imported, is the wrong way of securing war taxation, and suggested a substitute which would remove the 10 per cent import tax on crude, and place a 5 per cent tax on all articles manufactured out of rubber. The association further recommended that no such tax would be levied on rubber articles for exportation.

The complete substitute clause offered follows:

"That there shall be levied, assessed, collected and paid; (A) Upon all manufactured rubber articles containing in whole or in part crude rubber or reclaimed rubber sold by the manufacturer, producer or importer, a tax of 5 per cent of the price for which so sold; provided, that in case where there are contracts in existence for the delivery of such manufactured articles at the time this act becomes a law, the manufacturer, producer or importer shall add to the price for which such article is to be sold, 5 per cent of the contract price, and shall collect and make monthly returns of the same as provided for in Section 601 of this act: Provided further, that no such tax shall be levied, assessed, or collected upon manufactured rubber articles destined for exportation."

In the hearing before the Senate Finance Committee it was shown that there are 300 manufacturers of rubber in the United States, and that the volume of business in the year 1917 was approximately \$600,000,000, of which in the past year, \$250,000,000 has been in automobile tires. It is expected that a 5 per cent tax on manufactured rubber goods will produce \$30,000,000 war revenue, with the 10 per cent tax on crude eliminated. The rubber manufacturers expressed a willingness to pay the 5 per cent tax on the ground that the government must have money and that the entire rubber industry was patriotic in its effort to co-operate with the government.

The hearing brought out that truck tires is one of the great products of Akron, and these could not in any wise be considered a luxury. It was shown that the 5 per cent tax on tires and tubes was a tax on necessities, whereas such luxuries as toy balloons were not being taxed.

At present there is not a pound of rubber growing under the American flag, and the submarine warfare has practically driven the rubber trade from the Atlantic to the Pacific Ocean. It now requires 90 days to get supplies of crude rubber to this country. The rubber association

asked the government to help the rubber industry to bank up stocks of crude rubber for the protection of the American public.

Martin W. Littleton, speaking for the Rubber Assn. of America, said:

"It is a fact that rubber is gotten from the Federated Malay States upon the 7½ per cent export tax; that it was taken to England; and that they have got yet to fix an export tax upon it; but it is to be expected in all reason that they will fix an export tax upon the rubber which is shipped to this country. If that shall take place, and it is imminent, there will be a 7½ per cent of the Malay States export tax, the additional tax which they may impose in England as an export tax; and then if you add the 10 per cent ad valorem upon the crude rubber, and add these together, you have fixed an unusual burden upon the material itself before the manufacturer meets the article or the article meets the manufacturer, and in that way when the strength of the whole manufacturing industry is needed, and needed to its full, it does seem that the notion of excise taxation could be very happily used and extended to bring about the desired result."

In drawing attention to the apparently conceived idea of the Ways and Means Committee that automobile tires and tubes are luxuries, F. A. Sieberling, president of the Goodyear Tire & Rubber Co., said: "The concern I represent is probably making more pneumatic tires than any other company in the United States. Two-thirds of our business is in the villages and on the farms. The Middle West and the South constitute the great field in which we operate. The gentlemen who are living in the cities and see the high-class automobiles get the impression that the high-class car is the large factor, but more than three-fourths of the automobiles in the United States are sold under \$1,000, and our tire field naturally follows the automobile. It is the great article now of utility. Our field is the Middle West and the South, and in tires for cheap cars."

## War Leaders Address Editors

### Analyze Nation's Problems Before 109 Representatives of Business Papers

WASHINGTON, May 25—Cabinet members and heads of the various government war boards to-day addressed 109 editors representing the business publications of the United States on the industrial and economic problems brought by the war. All agreed that business is going to be bigger, but of a different character. The demand for necessities and the elimination of non-essentials will involve a transition of business. Men, factories and capital now producing non-essentials will be needed for an increased output of necessities. Further details brought out during a day of rapid fire presentation of the essence of every great national problem appear on pages 1036 to 1041.

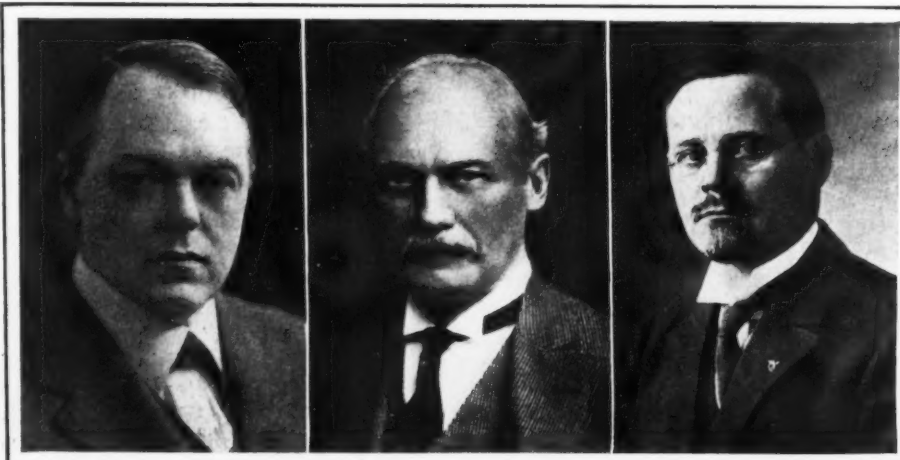
The program of the meeting, which comprised talks by seventeen men now at the head of the most important war activities of the government, was prepared by the Editorial Conference of the New York Business Publishers' Assn., Inc., of which David Beecroft, directing editor of THE AUTOMOBILE, is chairman. The session was held in the New Willard hotel and lasted from 9 a. m. till nearly 5:30 p. m.

### England Wants Tires Only for Government

NEW YORK, May 25—England has declared an embargo on the importation of rubber goods into that country except under the license of the board of trade. From now on, only Government tires will be allowed in.

Shipments to Scandinavian countries, formerly by way of London, are now through Halifax. Licenses, however, must still be secured in London.

### Members of the New Automotive Committee



COKER F. CLARKSON  
General Manager S. A. E.

CHARLES CLIFTON  
(Chairman) Pres. N. A. C. C.

C. W. STIGER  
Pres. M. & A. M.



## Form Automotive Committee

**Men Prominent in Industry Will Aid Government—Clifton Is Chairman**

WASHINGTON, D. C., May 25—An Automotive Committee of the Council of National Defense has been appointed to act as an intermediary between the automotive industry and the government in matters relating to government needs as to explosion motors and motor transport matters. The committee will also have in charge all questions relating to field artillery and farm tractors as related to the food supply of the country.

Chairman of the committee is Chas. Clifton, president of the N. A. C. C., and other members are: C. W. Stiger, president of the Motor & Accessory Manufacturers, and president of the Stromberg Motor Devices Co.; H. L. Horning, chairman of the Tractor Standards Division of the S. A. E., also chief engineer of the Waukesha Motor Co.; Henry R. Sutphen, chairman of the Marine Standards Division of the S. A. E., and vice-president of the Submarine Boat Corp.; K. W. Zimmerschied, past chairman of the Standards Committee, S. A. E., and metallurgist of the General Motors Corp.; Coker F. Clarkson, general manager of the S. A. E., and Frank H. Russell, president Aircraft Manufacturers' Assn.

In addition to this committee acting as advisory to the government in all matters involving the use of the internal combustion engine in automobiles, trucks, ambulances, farm tractors, motor boats, airplanes, field artillery, etc., the committee will act as a receiving body to consider complaints of manufacturers in these various lines, and in turn pass these complaints on to other authorities for final action.

It is planned that the Automotive Committee will take cognizance of the work of

the S. A. E. in an effort to get explosion motor products which the government purchases as free from complication as possible and standardized to the greatest extent.

Whereas many of the committees appointed by the Council of National Defense are temporarily residing in Washington, it is not expected that the members of the Automotive Committee will have to take up their residence in the capital.

The appointment of the Automotive Committee is but one more example of the good work accomplished in automotive transportation by the Council of National Defense and naturally much of the credit in this work rests with Howard E. Coffin, who is one of the very active spirits in the advisory commission of the Council and who has the interests of the automotive industry very much at heart.

## P. M. Heldt with The Automobile

NEW YORK, May 29—P. M. Heldt, for many years Engineering Editor of *The Horseless Age*, has joined the editorial staff of THE AUTOMOBILE.

Mr. Heldt ranks among the very leaders in the field of automobile engineering literature and is fairly entitled to a large share of credit for the present high state of development of automobile design. His books especially are regarded as standard reference works in automobile engineering.

THE AUTOMOBILE was able to secure Mr. Heldt's services through the co-operation of the publishers of *The Horseless Age*, who, because they have confined their energies more and more and now exclusively to the dealer field, felt that in justice to Mr. Heldt he should be released from contractual obligations in order to enable him to continue in work more suited to his talent and liking and for which he is uniquely qualified.

## Marmon To Motorize Artillery

**Famous Engineer Appointed To Aid Field Artillery Development**

INDIANAPOLIS, IND., May 28.—Howard C. Marmon, president of the Nordyke & Marmon Co., has been called to Washington to take part in the development of motorization of the field artillery, supplementing the work which the tractor standards committee of the S. A. E. has been doing for some time. Mr. Marmon is perfecting an organization.

Howard Marmon is eminently well fitted for the work. A length of experience in the automobile industry equalled by few either in America or abroad, and responsibility for the production of many different designs of the highest quality cars entitle his opinion to receive the greatest respect. It would be difficult to think of anyone better able to judge the practicability of new ideas.

Howard Marmon has the somewhat rare quality of ability to appreciate the new thing despite a very close association with old things. His very early entrance into the automobile industry has not made him conservative in either big things or small. His company has followed a policy of general conservatism, but has never allowed its engineering to drop behind the rest of the world, and more than once the Marmon company has occupied the leadership in automobile development.

There are few men to whom automobile engineers are so ready to raise their hats, few whose opinions carry greater weight. Moreover, Howard Marmon is still as he always has been—judged by his deeds and not by his words.

MASSILLON, OHIO, May 26—The Central Steel Co., as a result of a Liberty Bond sale campaign, announces that it is prepared to purchase \$50,000 worth of these. The Massillon Rolling Mill Co. will purchase \$25,000 worth. In order



K. W. ZIMMERSCHIED  
Metallurgist General Motors  
Co.



FRANK H. RUSSELL  
Pres. Aircraft Manufacturers Assn.

H. L. HORNING  
Chief Engineer Waukesha  
Motor Co.

HENRY R. SUTPHEN  
Vice-pres. Submarine  
Boat Corp.

Members of New Automotive Committee

to encourage the employees to buy Liberty Bonds instead of placing their money in the banks, the Central Steel Co. will pay all of its employees who buy one or more bonds, one-half of 1 per cent more interest, thereby giving them 4 per cent on their investment, the usual interest in banks.

GRAND RAPIDS, MICH., May 28—It is possible that two or three motor truck manufacturing companies in this city will secure orders for motor trucks for the United States war department service. George F. Sweet, manager of the United Motors Co., is now in Washington consulting with Government officials about the kind of truck needed.

#### A. A. A. To Aid in Motor Transportation

CLEVELAND, May 25—The American Automobile Assn., at its annual meeting in this city to-day, voted to render every possible assistance to the Government both in motor transportation and in the sale of Liberty bonds. An automobile transportation committee was appointed. The sale of Liberty bonds will be effected by setting aside a day, probably June 7, which will be known as the A. A. A. Liberty bond day, at which time car owners and dealers throughout the country will devote the day to further the sales of the bond issue. Officers and directors were elected, and numerous other important details discussed and acted upon.

Officers and delegates were elected as follows, and completed the morning program:

Dr. H. M. Rowe, president; Ralph W. Smith, Colorado, vice-president; P. J. Walker, California, vice-president; D. Jameson, Pennsylvania, vice-president; Royal Scott, Toledo, Ohio, vice-president; A. J. Lupton, Indiana, vice-president; Preston Beldin, Virginia, vice-president; H. A. Bonnell, New Jersey, treasurer; John A. Brooks, Connecticut, secretary; A. G. Batchelder, chairman of the executive committee.

#### Pershing's Motor Drivers Selected

WASHINGTON, May 28—John J. Jennings, George Linthicum, Elgin Brain and Ray Middleton have been selected by the War Department to go to the front in France as motor drivers with General Pershing. They were recommended to the government by the Society of Automotive Engineers, who asked that the society recommend drivers of standing and marked ability. All of these gentlemen have volunteered their services.

SPRINGFIELD, MASS., May 25—As a result of action on the part of the Baush Machine Tool Co., 173 subscribers have come forth and bought Liberty Bonds totalling \$30,000. This number represents over half of the company's employees. The company not only succeeded in raising a substantial sum of money on the Liberty Bond sale, but also managed to combine a flag raising with the event.

## Plan Village for Joy Field

\$1,000,000 To Be Spent by U. S.  
To Fit Land for Aviation  
—1700 Acres Bought

DETROIT, May 26—The Joy aviation field near Mt. Clemens, Mich., which has just been purchased by the government from H. B. Joy, has witnessed considerable activity during the last few days. Plans are being arranged to expend the \$1,000,000 which the government has appropriated to fit this land for aviation work.

This aviation school is one of nine which the government will build in various parts of the country.

Airplanes and seaplanes will be tested on these grounds. Even a church will be located on the property. The government has purchased 1700 acres for the village, which will have approximately 1000 inhabitants at the start. It will be permanent.

The school at Mt. Clemens is to be a one-squadron plant. There will be twelve hangars, 60 by 60 ft., each with a capacity of twelve machines. There will be six barracks, each with a capacity of 150 men, with the necessary mess halls for both officers and men.

Officers' quarters, quarters for the non-commissioned officers, a house for the commanding officer and a club house are among the buildings called for in the plans. There will be thirty-six officers. While the buildings will be only semi-permanent, they will be modern in every way, especially as to the plumbing. All will have baths with showers in the barracks.

The school, with numerous class rooms and rooms for instructors, will be about 60 by 200 ft. In this the future flyers will be taught the technical side of their profession. Included among the buildings are a machine shop, an aero repair shop, a supply department, quartermaster's department and a guard house. The non-commissioned officers' quarters will house twenty-four men.

A hospital, blacksmith shop, heating plant, water supply and sewer will be constructed also. The buildings, which will be of one-story type, will be of frame on concrete foundation. They will cost in the neighborhood of \$600,000, and the other equipment will bring the cost to a full million.

#### 10 Hispano-Suiza Aviation Engines a Week

NEW YORK, May 25—Production of the Hispano-Suiza eight-cylinder aviation engine has now reached about ten a week at the Wright-Martin factory in New Brunswick, N. J., the old Simplex plant. It is expected that production will be steadily increased to at least ten engines a day by the end of the year, and the plane factory will be easily able to keep pace with the engine production or even

to exceed it. To date about forty engines have been sent to France, the first passing the French government tests with flying colors, proving to be interchangeable in every detail with the engines made in French factories. The engine produces 150 hp. at under 1500 r.p.m. and in a recent test a plane fitted with one of these engines attained 9700 ft. in 15 min., getting off the ground in 5 sec., with a passenger as well as the pilot.

#### DePalma Experimenting with Airplane Engine

CINCINNATI, May 28—Ralph DePalma, who owns the Packard airplane engine racing car, is experimenting with this engine while training for the speedway races here. DePalma is determining what improvements are necessary and is keeping the Packard company and the Government advised.

#### Making Giant Airplane Engine

BUFFALO, N. Y., May 26—G. C. Goode, English aviator, is supervising the manufacture of a 350 hp. airplane engine at the Sterling Engine Works. This company has purchased the American rights for the Sunbeam airplane engine, 12-cylinder 350 hp., and 18-cylinder 500 hp. engines, and has taken over contracts for them. The contracts demand that operation of manufacture start by June 1. The new engine which Mr. Goode is working upon will weigh 1075 lb. and drive a bomber weighing 2200 lb. at a speed of 130 m.p.h. at an altitude of 14,000 ft. Mr. Goode states that present-day air fighting in Europe is done at an average altitude of 9000 ft.

#### Rickenbacher Called to Washington

DETROIT, May 26—Eddie Rickenbacher has been called to Washington for consultation regarding the starting of aviation practice work by the racing drivers aviation corps which was formed through his efforts.

#### Asks Detroit for Eight Motor Companies

DETROIT, May 26—Detroit has been asked by the central department at Chicago to furnish eight companies for the motor truck section of the quartermaster's reserve corps. This means the raising of a regiment made up of truck drivers and mechanics. Captain William E. Dunn of the United States field artillery will superintend the work. The reason for selecting Detroit is ascribed to the success already enjoyed in enlisting one company and because Detroit is the center of the automobile industry.

#### Liberty Bonds for Marion-Handleys

NEW YORK, May 27—Marion-Handley cars may be bought with Liberty Bonds. The Mutual Motors Co. has arranged to cash these bonds at \$110 as payment for every \$100 paid for the car.



## 60 G. M. Tractors a Day

Production Will Be Reached Upon Completion of Three New Plants

NEW YORK, May 25—Tractor production on an extensive scale is being planned by the General Motors Corp., which has added the Samson Iron Works, Stockton, Cal., turning out about eighteen tractors a week. The new interests plan to enlarge the facilities of the Stockton plant and erect three other similar plants in various sections of the country, which will be ready for operation by the early spring of 1918.

By next October, General Motors will be producing fifteen tractors a day. By the time the new plants are finished, tractor production is expected to reach sixty a day.

These plants will be located in Pontiac, Mich., near Kansas City, and at some point on the Atlantic Coast, the location of which is yet to be determined.

The Samson tractor is known as the sieve wheel tractor, the large drive wheels being of the Webb pattern, which does not pack the ground.

KANSAS CITY, May 26—There are nearly 6,000 farm tractors in use in the state of Missouri. J. C. Mohler, secretary of the Kansas State Board of Agriculture, has made a census of the state which reveals this figure. The Kansas City Tractor Club is urging that the tractor owners operate their tractors 24 hrs. a day and that they devise means whereby farmers not owning tractors may have the use of them.

### Willys' Boat to U. S.

TOLEDO, May 28—John N. Willys, president of the Willys-Overland Co., has notified the Bath Iron Works at Bath, Me., to discontinue the fitting out of his yacht, which he is having built at a cost of more than \$500,000. Mr. Willys will have the vessel turned over to the Government for war work. It resembles a torpedo boat destroyer and will make 30 knots an hour.

### Pennsylvania Section on Outing

PHILADELPHIA, May 25—The Pennsylvania Section of the Society of Automotive Engineers to-day held its outing to Glen Lock, Pa. About forty members attended. The day was spent in games and other entertainment.

### Automobiles Displacing Chinese Horse-Vehicles

SHANGHAI, CHINA, April 7—Automobiles are gradually displacing horse vehicles in China. After 66 years of activities the foremost horse-vehicle landmark in China is now recognizing the steady advancement in the sale of automobiles in this city. This establishment has recently turned to the making

of automobile and truck bodies. The horse-vehicle features are now gradually yielding to the steady encroachments of the automobile department, which is conducted by an American.

### Ford Truck Out in July

DETROIT, May 28—Ford trucks will be in production and will be turned out at the rate of twenty-five a day in July. As stated exclusively in THE AUTOMOBILE for April 19, this truck will be provided with an overhead worm-drive axle operating in connection with the power plant now employed for the Ford passenger car and through a planetary gearset. There has been a large demand on the Ford company for this truck by dealers who appreciate the wide range of purposes which it may fill. Final details are rapidly being cleared up at the Ford factory so that production can be started at the earliest possible minute.

### 44.6 Miles Per Gal. Record for Maxwell

DETROIT, May 28—The "mileage per gal. test day" held by the Maxwell Motor Co. on May 23 developed some high records. James Lephart of Greenville, Ohio, a Maxwell dealer, secured a mileage of 44.6 miles on 1 gal. of gasoline. Other high marks displayed by the reports to the factory are: Moller & Futterer, Quincy, Ill., 40.1 miles per gal.; J. L. Alford, Salvisa, Ky., 31.5; J. L. Adams, Rome, Ga., 26.3; Rabbit-Polson Co., Phoenix, Ariz., 35.6; Biever Motor Co., New Haven, Conn., 43.1; R. R. Carroll, 36; George Naipier, Macon, Ga., 44.

### Mechanics for Overseas Duty

DETROIT, May 26—The Cadillac Motor Car Co., Packard Motor Car Co., Hudson Motor Car Co., Ford Motor Co., Studebaker Corp., Chalmers Motor Co., Continental Motors Corp. and the Northway Motors Co. will each select certain mechanics from their organization to complete the plan of the United States government which was reported in last week's issue of THE AUTOMOBILE, to send seventy-five expert mechanics for a course of extensive training in the airplane factories of France. The Cadillac Motor Car Co. has also been requested to furnish two combination chauffeurs and mechanics to drive cars for the marine corps in France. The two drivers will be enrolled for the term of the war with the rank of sergeant. They will receive \$38 a month with \$15 for extras and 20 per cent additional for foreign service. Their board, and clothes and transportation will be furnished by the government. The mechanics going to the airplane factories will receive \$4 a day and transportation and will retain a civilian status.

DETROIT, May 28—H. M. Leland, president of the Cadillac Motor Car Co., addressed members of the Steel Treating Research Club at a banquet last Saturday night. Mr. Leland discussed the war and declared himself in favor of a greater navy. He believes that the war will continue for at least 5 years.

## Ford Daily Expenses \$800,000

30-Day Shut-Down Would Cripple Company — 100,000 Trucks Planned

DETROIT, May 28—The Ford Motor Co. requires between \$800,000 and \$900,000 daily for running expenses. Assets are so ravenously consumed by the operations of the factory that if production were halted for 30 days the Ford company would be forced to close its doors. These were statements made by Frank L. Klingensmith, vice-president and treasurer of the Ford Motor Co. during the hearing of the Dodge-Ford suit Saturday.

With this testimony the Ford company sought to emphasize the point that the River Rouge smelter plant contemplated by Henry Ford and objected to by Dodge brothers, is necessary to manufacture iron directly from ore for use in the Ford products.

Mr. Klingensmith also stated that at the last meeting of the board of directors of the Ford company held May 1, 1917, a 50 per cent dividend was declared in opposition to James Couzens, who desired a 100 per cent dividend.

C. Harold Wills, chief engineer of the Ford company, declared that Henry Ford had talked about producing 100,000 trucks this year and that materials for 10,000 of them had been ordered 4 months ago. He also testified that there has never been enough room at the Ford plant to supply the demand and that the company could have sold 100,000 trucks and 100,000 closed cars last year if it had had them. Testimony developed that the last reduction in price cut the profits in half; but the company had made a profit of \$60,000,000 on 500,000 cars in 1915, and \$30,000,000 on 750,000 cars in 1916. He discussed the value of three working shifts a day and said he wanted to eliminate the midnight to 8 a. m. shift because he was impressed by the number of men who complained, by the number of wives who complained, and by the general inefficiency demonstrated in those hours. The case has been continued to June 4.

### Ford Smelter Pronounced a Saver

DETROIT, May 26—W. B. Mayo, construction engineer for the Ford Motor Co. testified in the Dodge-Ford suit yesterday that the River Rouge smelter which is being erected by the Ford Motor Co. would eliminate a large part of the cost of manufacturing pig iron parts for Ford parts. Many other consulting engineers gave similar testimony.

### Ford Takes Agricultural Census

DETROIT, May 28—The Ford Motor Co., co-operating with the food preparedness board of Michigan, has distributed cards throughout its plant and is listing all of those workers who are available for harvest work.

## Mexican Demand for Trucks

**Mining Companies Using Them  
—Heavy Business Predicted  
—Request from Oil Region**

LAREDO, TEXAS, May 25—An unexpected and rapidly growing demand for motor trucks is coming from Mexico and many carloads of these vehicles have entered that country through the El Paso, Eagle Pass and Laredo ports of entry during the last 3 or 4 weeks. The shipments are constantly increasing, the demand coming chiefly from the larger mining companies that are reopening their respective properties. Most of the orders for motor trucks for Mexico shipment are placed with dealers in cities and towns on or adjacent to the Rio Grande, particularly San Antonio and El Paso. Recently a mining company that operates a large property in the State of Chihuahua placed an order for eight Jordans and the vehicles were promptly shipped.

It is stated by the American representatives of different truck manufacturing companies who have been on trade trips into Mexico during the last few weeks that everything points to a very heavy business in this line in that country as soon as normal conditions are restored there. All of the larger foreign-owned mining companies plan to utilize trucks instead of the slow-moving burro wherever the roads are good enough to afford the operation of the motor vehicles. It is interesting to note that the motor truck has had its development chiefly during the last 6 years that mining operations in Mexico have been suspended.

In the oil producing territory around Tampico many American companies are installing motor trucks for the transportation of supplies and lighter machinery to the different camps.

Naturally, native Mexican business interests are as yet not doing much buying of motor trucks, but it is expected that a demand for these vehicles from this source will be created later on, as the financial condition of the country improves.

### Detroiters Discuss Motorizing the Army

DETROIT, May 31—The automobile manufacturers here will hold a meeting to-day to discuss means for motorizing the army. Lee Anderson and Dubois Young, vice-presidents of the Hupp Motor Car Corp., William Knudson of the Ford company, and Capt. W. E. Dunn of the U. S. Army will make addresses.

### \$2,000,000 Menominee Truck Order

NEW YORK, May 29—The Menominee Motor Truck Co. has received an order for trucks amounting to \$2,000,000 from the Claud Nankivel Co. Mr. Nankivel is now in Moscow, Russia. According to plans, 200 trucks are to be delivered this that the price will be full and the terms 4 years. The contract further provides that the price will be full and the terms

of sale 25 per cent of price paid in advance. The balance is to be paid f.o.b. Menominee, when the cars are ready for delivery.

### Degree of Honor for College Aviators

WASHINGTON, May 29—The War Department has established a special degree of honor as an added incentive for the student aviators who have begun training at the universities co-operating in building up the air service. Men who qualify by examination will be placed upon an honor roll for hard work during the weeks of preliminary theoretical training.

### Robinson Heads Republic Tire Board

YOUNGSTOWN, OHIO, May 29—Thomas L. Robinson, president of the Republic Rubber Co., has resigned to accept the position of chairman of the board of directors of the company, and Guy E. Norwood, formerly secretary of the B. F. Goodrich Rubber Co., has been elected president to succeed Mr. Robinson. Mr. Norwood will be in charge of operation and sales. John H. Kelly, who for 14 years has been connected with the Republic Rubber Co., and who for 5 years has been in charge of sales, has resigned. Charles W. Hardin, vice-president of the Republic Rubber Co. of New York, will go to Youngstown to co-operate with Benjamin Swinehart and M. Murray in charge of sales of pneumatic and solid tires. It is expected that the tire output of the Republic will be tripled in the near future.

Mr. Kelly was with the Goodrich company previous to his 14 years' affiliation with the Republic. Previous to his departure from the Republic, he was presented with a platinum watch by the managers and ex-managers of the Republic selling stores. The office force presented him with a loving cup.

### Kelly Joins Hewitt Rubber

BUFFALO, N. Y., May 31—John H. Kelly, for years connected with the Republic Rubber Co., has resigned and associated himself with the Hewitt Rubber Co. of this city, which concern manufactures a general line of mechanical rubber goods for railroads and is planning to install a pneumatic tire department which is expected to have an output of 5000 tires per day. Mr. Kelly will have charge of operation and sales in the Hewitt company. Also going with Mr. Kelly from the Republic company is Frank V. Springer, who has been in charge of railroad supplies. Mr. Kelly will be first vice-president of the Hewitt company and Mr. Springer a second vice-president. The Hewitt company started the manufacture of mechanical rubber goods in 1905. H. H. Hewitt is entire owner of the plant. It is planned by Mr. Kelly to begin the production of a complete line of pneumatic tires at the earliest possible date.

NEW YORK, May 29—A. C. Galbraith has become sales representative with the Gryphon Rubber & Tire Corp.

## U. S. Needs 10,000 Aviators

**Coffin Tells University Club  
5,000 Planes Necessary  
for 1,000,000 Troops**

WASHINGTON, May 29—That "it is a blind army which goes into the war without airplanes" and "in the battle in which there are twenty-eight airplanes lost there are thousands in the air" was asserted by Howard Coffin, chairman of the advisory committee of the Council of National Defense, in an address before members of the University Club of Washington.

Continuing, Mr. Coffin said that for 1,000,000 Americans in the field there should be 5000 airplanes. He expressed the view that 10,000 flyers are needed for the European war service. France found, he said, that it required 50,000 aircraft mechanics, and he pointed out that the United States troops going into the European war must depend, until America is in position to do its turn, upon the aircraft of the Allies.

The statement of Mr. Coffin was of much interest when taken in connection with the recent statement by the National Aircraft Production Board, through President Hawley of the Aero Club of America, that the immediate training and equipment of 10,000 American air men for the European front had been undertaken.

The most desirable men, according to Lieutenant Colonel Rees, British airman with the British war commission, and winner of the coveted V. C., are young fellows, weighing up to 170 lb., preferably college men, and boys of eighteen to twenty-five.

"They must be men of more than ordinary endurance," said Colonel Rees, "because they have great responsibility and have to be trusted to use their heads. Their integrity must be unquestioned."

Col. Rees said the fighting height was about to be increased from 20,000 to 30,000 ft. by the new type machines being manufactured now. This probably will be the type manufactured for America's first 10,000 air-men, because it is known that the British aircraft plans are in the hands of the American Government.

### Vincent to Talk at Mid-West Section

DETROIT, May 29—J. G. Vincent, vice-president, in charge of engineering of the Packard Motor Car Co., will discuss government aviation engine tests before the Mid-West Section of the Society of Automotive Engineers June 1.

### Ford Rescinds N. Y. Building Plans

NEW YORK, May 29—The Ford Motor Co. has rescinded the order for constructing a building on Broadway and Fifty-second Street, having found the cost to be \$1,250,000 instead of \$740,000.



# Louis Chevrolet Wins at Cincinnati

Veteran Captures 250-Mile International Sweepstakes in Frontenac at 102.18 M. P. H.—Vail's Hudson Second and Gaston Chevrolet's Frontenac Third

## Summary of 250-Mile Race

(Time subject to correction)

Car	Driver	Time	M.P.H.
Frontenac	L. Chevrolet	2:26:47.90	102.18
Hudson	Vail	2:27:57.44	101.3
Frontenac	G. Chevrolet	2:28:45.73	100.9
Duesenberg	Milton	2:32:47.55	98.2
Stutz	Cooper	2:35:38.72	96.4
Ogren	Henning	2:35:49.00	96.3
Duesenberg	Hearn	2:35:57.65	96.2
Hudson	Patterson	2:38:17.02	94.8
Oldfield-Delage	Oldfield	2:38:25.43	94.7
Hudson	Mulford	2:39:18.17	94.1
Omar	Toft	2:39:28.92	94.0
Newman Sp.	Taylor	2:42:14.45	92.4
Mercer	Thomas	2:43:27.30	91.8
Crawford	Ewing	2:46:54.55	89.8

## CINCINNATI MOTOR SPEEDWAY, May 30—Special Telegram—

Louis Chevrolet, in a Frontenac, won the feature event of 250 miles in the Memorial Day Meet here at a speed of 102.18 m.p.h. Second place was won by Vail, in a Hudson, who followed the veteran across the wire by a few seconds over a minute. Louis's brother, Gaston, in a sister Frontenac, captured third, pushing Vail so close that early announcements had him in second place.

Louis Chevrolet ran a consistent race for the entire 250 miles, never making a stop, and the \$10,000 prize of the \$25,000 purse was well earned. De Palma, in the Packard twelve, was the leader at the start, but Chevrolet challenged him early, taking the lead before the unlucky Italian was sent to the side lines with a splinter through his radiator.

There was a good attendance, numbering 30,000 to 50,000 and the entire crowd rose to its feet for the brushes between De Palma and L. Chevrolet, for first, and between Gaston Chevrolet and Vail for second.

There were two accidents among the

twenty-eight starters, but no one was hurt. Stringer's M-E-L turned over and Osteweg's Osteweg special burned up on the back stretch.

The day's card included three events, a Ford invitation for 20 miles, won by Stewart at 63 m.p.h.; a free-for-all not open to drivers in the main event. This was won by Rothert in a Hudson at 87.9 m.p.h. Rothert had a walk-away, the only competition being a Paige driven by Nikrent. All three races were won by Car No. 1.

## Few Weak Spots

From an engineering standpoint the most prominent feature of the race was the lack of weak spots in the cars. No marked trouble developed along any line. Rod failures, which were common in previous races, were reduced to one, this being on the Mercedes driven by Fontaine. There were eleven stops for tires, many of these being by cars which had to make more than one stop. There were four stops for plugs.

The worst piece of misfortune was the

accident to DePalma's Packard, on which the radiator was punctured by a splinter when he was in the lead with the engine running perfectly. The Mercer special driven by Henderson went out with bearing trouble and Buzane's Detroit special with a broken clutch. One of the Frontenacs had a broken waterjacket; Haines' Mercer went out with a broken oil line; Lecain's Delage had a broken valve plunger; Stringer's M-E-L special went out on the back stretch with a broken knuckle, and Devigne's Delage with a cracked cylinder.

Louis Chevrolet's winning car used Bosch magneto, Miller carbureter, Oilzium K. L. G. plugs, Goodyear tires, Rudge-Whitworth wire wheels, Hartford shock absorbers and Boyce Motometer. Ira Vail's Hudson, second, used Delco ignition, Hudson carbureter, Oilzium, A-C plugs, Goodyear tires, Rudge Whitworth wire wheels, Hartford shock absorbers and Boyce Motometer. Gaston Chevrolet's Frontenac used the same equipment as that of his brother.

## Goodrich Out of 1917 Racing

NEW YORK, May 26—The B. F. Goodrich Co., Akron, announces its retirement from automobile racing during the 1917 season. Due to consideration of serious obligations to the Nation, the company believes that it should retire from automobile racing and concentrate on the needs of the country.

## Arrange Intercity Run

CHICAGO, May 25—The Intercity Reliability Run will be a 3-day affair, according to plans outlined at the recent meeting of the American Automobile Association. The schedule calls for a 571-mile run, starting at Buffalo, going through Danville, Elmira, Norwich, Syracuse, Rochester and Clarence County Club. To date there are fifty entries.

DETROIT, May 25—The Auto Spin Flag Co., New York, has concluded arrangements with the Wallace C. Hood Service Bureau, to supervise the entire distribution for all countries of its latest device, the Auto Spin flag.

CHICAGO, May 26—The Service Motor Co. has contracted to handle the entire factory output of Quayle lock switches. The switch locks the ignition and is for application to 1914, 1915, 1916 and 1917 Ford cars.

HACKENSACK, N. J., May 25—The Chimock Tire & Rubber Co. has been incorporated in Delaware with a capital of \$250,000 to manufacture tires. The incorporators are C. A. Cole, P. E. Britsch, A. R. Oakley.



Louis Chevrolet, winner of the 250-mile International Sweepstakes on the Cincinnati speedway, in his Frontenac. Light weight is a feature of this car, its engine being of Lynite, an aluminum alloy

## Personals

NEW YORK, May 28—A. J. Brosseau, vice-president of the Federal Motor Truck Co., Detroit, will on June 1 become president of the International Motors Co. He will succeed Vernon Monroe, who will take a rest in California. Mr. Monroe became president of the International Motors about 3 years ago, when the company was reorganized. He was secretary prior to that.

PHILADELPHIA, May 28—Charles S. Butler, for more than 6 years advertising manager for the Hess-Bright Mfg. Co., has resigned to become sales manager for the Carlson-Wenstrom Co., Philadelphia, which is shortly to place on the market a new double row ball bearing. Prior to Mr. Butler's long connection with the Hess-Bright company, he was for several years connected with the executive forces of the Link Belt Co., Philadelphia.

DETROIT, May 29—W. L. Agnew has resigned as manager of advertising in the Chalmers Motor Co.

JACKSON, MICH., May 25—G. E. Drawe, assistant general manager of the Mutual Motors Co., has been elected to the board of directors and also treasurer of the company, succeeding W. T. Miller, former treasurer, who has resigned. Mr. Drawe will retain his duties as assistant general manager along with his new work.

BUFFALO, N. Y., May 25—H. F. Russell has been made sales manager of the grey iron foundry department of Farrar & Trefts, Inc. He was formerly connected with the Lumen Bearing Co.

NEWTON, Mass., May 26—F. S. Young has become advertising manager of the Stanley Motor Carriage Co. He was formerly associated with the Stalker Advertising Agency, Toledo, and was later advertising manager of the Allen Motor Car Co., Fostoria, Ohio, and more recently with the Amco Motor Co., Norwalk, Conn.

C. E. Broad has joined the company in charge of engineering and designing. He was formerly in the engineering departments of the Packard and other Detroit companies.

CHICAGO, May 25—S. O. DeOrlow has resigned as engineer of the Woods Motor Vehicle Co. to become chief engineer of the Oak Mfg. Co.

NEWARK, N. J., May 26—H. W. Scholl, for the past 4 years with the sales force of the Splittorf Electrical Co., has been appointed Eastern representative, with headquarters in this city.

KOKOMO, IND., May 27—A. W. Milman, formerly with the Mitchell-Lewis Co., has been appointed assistant purchasing agent of the Haynes Automobile Co. to

succeed T. C. Heady, who is now with the Smith Form-A-Truck.

DETROIT, May 29—C. V. Herbert, who is making tractors, and Ted Palmer of the Standard Parts Co., will enlist in the navy.

DETROIT, May 26—R. T. Middleton, sales manager of the Michigan Electric Welding plant of the Steel Products Co., has enlisted and been appointed a sergeant and will drive for the headquarters staff of the first expedition to Europe.

DETROIT, May 28—C. J. Fox has joined the Puritan Machine Co. in a special capacity. Mr. Fox was formerly service manager for the Hupp Motor Car Corp.

CHICAGO, May 26—J. T. Sandwich, for many years past purchasing agent of the F. A. Ames Co. and its two subsidiaries, the Ames Motor Car Co. and the Carriage Woodstock Co., Owensboro, Ky., has resigned and entered the employ of the Service Motor Supply Co.

ST. LOUIS, Mo., May 25—W. F. Sheehan has been appointed general manager of the Globe Motor Truck Co. C. T. Schaefer has become chief engineer. He was formerly chief engineer of the Mogul Truck Co.

DETROIT, May 25—Nicholas Wilson has been appointed assistant traffic manager of the Harroun Motors Corp. He was at one time assistant traffic manager in the EMF Co., and has also been with the Studebaker and Maxwell companies in similar positions.

LOUISVILLE, KY., May 24—W. I. Shaw, general sales manager of the Kentucky Wagon Mfg. Co., has resigned. Mr. Shaw stated that he had been in ill health for some time and would rest for several months before taking up his connection with a large manufacturing company in New York.

CHICAGO, May 27—R. A. Smith has become manager of the local branch of the United Motors Service, representative of the Delco and Remy electrical systems and Klaxon horns.

LOUISVILLE, KY., May 25—S. M. Piper, of Buffalo, N. Y., is the new manager of the Louisville branch of the Studebaker Corp. He succeeds Wilson M. Taylor, an efficiency expert, who has been in temporary charge of the local branch since its establishment several months ago. Mr. Taylor will return to the general office of the Studebaker Corp., South Bend, Ind.

WAUKESHA, WIS., May 25—Mitchell Mackie, prominent in the tractor and truck trade as sales engineer of the Waukesha Motor Co., has been called to the front as Captain of a motor truck squadron.

KOKOMO, IND., May 26—Charles Lejuste, for more than 4 years with the Haynes Automobile Co., has resigned. He has not announced his future plans. Previous to his coming to the Haynes he was purchasing agent for the Apperson Automobile Co. and later served in the same office with the Haynes, holding the position of production manager at his resignation.

SEATTLE, WASH., May 25—M. G. Farnsworth, formerly Northwestern sales representative for the Abbott Corp., has resigned to form the Farnsworth Motor Car Co., which will distribute the Saxon and Abbott cars and Denby trucks.

KALAMAZOO, MICH., May 25—H. H. Harris has been appointed district manager of the Central States for the Barley Motor Car Co., maker of the Roamer. Robert Lanzing has been appointed special factory representative, covering the major portion of the South and Southwest.

AKRON, OHIO, May 25—Four promotions in the sales organization of the Firestone Tire & Rubber Co. were made within the past month. E. W. BeSaw was made assistant general sales manager, a newly created position. H. A. Grubb, Texas manager, succeeded him as western district manager. C. H. Sorrick was appointed manufacturers' sales manager, and J. D. Hess, Jr., Cleveland branch manager, was made manager of the pneumatic sales department to succeed him.

AKRON, OHIO, May 28—Five executives of the Goodyear Tire & Rubber Co. were promoted this past week. C. M. McCreey, former assistant manager of the Chicago district, is now special manufacturer's representative for that district; W. S. Boone, former supervisor of city sales in Philadelphia, is now special manufacturer's representative in New York City; G. H. Barmore has been promoted from branch manager of Milwaukee, Wis., to assistant manager of the Chicago district; A. J. Sear, who was branch manager at Sioux City, Iowa, succeeds Mr. Barmore at Milwaukee, and Mr. Sear's place is taken by W. S. Zigler, formerly city salesman in Milwaukee.

### F. C. Van Dyk Dead

RUTHERFORD, N. J., May 24—Francis Cornelius Van Dyk, president of the Rutherford Rubber Co., maker of Sterling tires, died May 21. He was 79 years old and was born at San Juan, Porto Rico. Up to the time of his death he was president of eight land companies and was interested in silk manufacturing. He was president of the South Scranton Throwing Co., vice-president and director of the North Jersey Title Insurance Co., Hackensack, and vice-president and director of the Second National Bank of Paterson for many years.



# Factory Activities

MUSKEGON, MICH., May 28—The plant of the Continental Motors Corp. at Muskegon is to be given over entirely to the production of truck engines. It is stated that the company has received a very large order from the United States Government and that for this reason the manufacturing of engines for passenger cars will be taken care of exclusively at the Detroit branch. The daily production in Muskegon is to be tripled. A large force is to be added and it is possible that the plant will be enlarged.

LANSING, MICH., May 26—The Tractor Producing Co. and the Duesenberg Motors Corp. have temporarily located in the plant of the Reliance Engineering Co. The Tractor Producing Co. makes four-wheel drive trucks and four-wheel drive tractors. But one type of each is being made, the tractor being confined to 30 hp. and the motor truck to the 3-ton type. The company has confined its business exclusively to Russia and France since the war started.

Officers of the company are president, Mr. Morton; vice-president, L. R. Williams, now in Japan; vice-president and secretary, Ralph Corley, New York; treasurer, David Dolan, New York.

The Duesenberg Motors Corp. builds engines for submarine chasers, airplanes and tractors, and is affiliated locally in production with the tractor company, which takes a certain per cent of the engines made by the Duesenberg corporation.

OAKLAND, CAL., May 26—The Fageol Motor Car Co. will start construction of its factory in June which will be erected at a cost of \$1,000,000.

NEW YORK, May 26—The Durst Mfg. Co., which has been manufacturing rubber and metal specialties for years, has entered the automobile field. It is now manufacturing inner tubes and pedal rubbers.

PLAINFIELD, N. J., May 27—The Niles-Bement-Pond Machine Tool Co. has completed a large addition to its plant and started another to cost \$25,000.

The Spicer Mfg. Co. will erect an addition.

COLUMBUS, OHIO, May 25—The Monitor Motor Car Co. will build a factory 1000 ft. long, according to plans of expansion.

RACINE, May 26—The Lavine Gear Co. has foundations practically completed for an addition to its plant which will treble production.

RACINE, May 26—The Maibohm Motors Co. is completing the installation of equipment for the manufacture of its own bodies. When the installation is complete, the company will make known

a number of new body styles; at the present time production is confined to a 2-passenger roadster which sells for \$795.

SCRANTON, PA., May 25—The Maccar Truck Co. has completed plans for a new factory in this city, which will be ready in 5 months and will afford a production of 1500 trucks a year.

ST. LOUIS, MO., May 28—The Singer Auto Traffic Signal Co. has opened a factory at 508-10 Wash Street. Work will begin as soon as dies are delivered.

PONTIAC, MICH., May 26—The Hess-Pontiac Spring & Axle Co., a subsidiary of the Standard Parts Co. will spend \$50,000 on new additions and will employ 200 more men.

COLUMBUS, OHIO, May 25—The Peters & Herron Dash Co. within the last year has completely reorganized and changed its business. Having built up a large organization all over the country for the sale of dashes, when the automobile began to put the horse out of business the company sold out its dash machinery, remodeled its plant and began the manufacture of seat covers, tire covers, radiator robes and other accessories.

MILWAUKEE, WIS., May 26—The Valley Steel Co., Milwaukee, has been organized by Milwaukee and eastern capital and has started work on the construction and equipment of a billet, bar and plate mill representing an investment said to exceed \$1,000,000, at St. Francis, a suburb of Milwaukee. The identity of the stockholders is not divulged. The new mill will be one of the largest in the middle west. It will have two 80-ton open hearth furnaces; a 104-in. plate mill; a 24-in. billet mill, and a 10-in. merchant bar mill.

CLEVELAND, May 26—The Torbensen Axle Co. is building a new addition with 30,000 sq. ft. of space.

NEW YORK, May 26—The Gwilliam Co. has taken the agency for S. R. B. bearings in the Metropolitan district. This company also has an agency in Philadelphia and handles all makes of ball, roller and thrust bearings.

LITTLE ROCK, ARK., May 24—A factory for the manufacture of automobile seat covers, dust hoods, tire covers, engine and radiator hoods and other fabric accessories for automobiles, will be established here under the direction of S. A. Myar, vice-president of the Henry W. Myar Co. Mr. Myar will be president and general manager of the new firm.

SALEM, OHIO, May 30—The Fabric Cord Tire Co. has taken over the plant

of the former American Cash & Register Co. Equipment for the production of 500 tires daily will be installed.

CLEVELAND, OHIO, May 30—The Jordan Motor Car Co. has increased the capacity of its plant by taking over 20,000 sq. ft. in an adjoining factory building of the same construction, and so located that it becomes virtually a part of the Jordan plant.

## PRODUCTION

DETROIT, May 25—Sales of the Maxwell Motor Co. during the first three months of 1917 were more than 58 per cent larger than the corresponding period of the preceding year. The total for the quarter was 19,000, an increase of 6968 over the first quarter of 1916. It is anticipated that there will be a surplus account of \$600,000, after paying the usual dividends of \$3,000,000 and a possible Government tax of between \$500,000 and \$600,000.

SYRACUSE, N. Y., May 25—The Franklin Automobile Co., during the week of May 19, received more orders than in any previous week in its history. Factory production also reached a new high mark, 216 cars being turned out in 5½ working days.

NEWTON, Mass., May 26—Shipments of Stanley steamers for April are reported as more than double those for the same period last year. May shipments were also more than 225 per cent over those of 1916.

Plans are now under way for an increase in production. The policy of supplying one chassis with an option of 3, 5, or 7-passenger body, will be continued, and unless increasing costs force a change, the present prices will be continued.

YORK, PA., May 26—Three hundred and fifty employees, including foremen of the various departments, have been granted a 10 per cent increase in wages by the Pullman Motor Car Co. The Pullman plant is enjoying an exceptionally busy season and is turning out from eighty to 100 cars a week.

DETROIT, May 28—Nelson cars are now being turned out by E. A. Nelson at the rate of ten to twelve cars daily, with shipments in this number being made to distributors in all parts of the country. The factory in Detroit is concentrating on three types, a two-passenger speedster listing at \$1,200, a four-passenger at \$1,400, and a five-passenger sedan at \$1,800. This car was described in THE AUTOMOBILE for Dec. 28, 1916. It has a four-cylinder valve-in-head engine, with a special Zenith carbureter. An illustration appears on page 1055.

# Steel Situation More Hopeful

60 % of Total Output Should Be Available for General Use, Excluding Government and Export Requirements

NEW YORK, May 29—In reviewing the material situation as it affects the automotive industries it is again only possible to say that future conditions are just as obscure as they have been for several weeks past. As time progresses, however, there is less and less reason to anticipate any insurmountable difficulties. In this connection the *American Metal Market* correspondent in Pittsburgh estimates that allowing for all possible government and export requirements these cannot exceed 40 per cent of the total as against a normal of 25 per cent. Meaning that domestic commerce will have to be content with 60 per cent instead of 75 per cent of the total steel output of the country. The same writer also calls attention to the fact that shortage of one special sort of steel will throw other kinds back on the market, as for example, a shortage of plates meant to be used together with bars in some construction would immediately release a quantity of bars, thus easing the general situation a little.

Another Pittsburgh report is still more encouraging, stating that the steel trade are confident of a total government and export demand not exceeding a third of the output, and it is also stated that buying shows signs of falling off. The attempts to organize or schedule requirements so as to be able to co-ordinate supply and demand are making themselves felt and it seems that there is strong probability the top price has been reached. This is still speculative, but it marks the end of any incentive to panic that may have existed.

Coal and coke appear just now to be more of a problem than steel not because the available supply is inadequate, but because probabilities of labor trouble have not, apparently been removed as thoroughly as was hoped by recent conferences and agreements.

Labor trouble is also affecting the copper output a normal supply of over 10,000,000 lb. a month now being withdrawn, owing to strikes on the part of the Western federation of miners. Zinc is also

affected, though to a lesser extent at present.

At St. Louis the price of spelter remains unchanged with very little buying reported. Buyers are thought to be anticipating a drop in price or at least are able to hold back a while in the hope of a fall.

## Export Gasoline Up 2 Cents

NEW YORK, May 25—Prices on gasoline for export have been advanced 2 cents a gal. by the principal refining interests. Gasoline for foreign shipment is now quoting at 36¼ cents a gal. for the 68-72 grade, in ten to ninety-nine cases, there being 9½ gal. to a case. In 100 to 199 case lots, the price per gallon is 36 cents, and in 200 to 299 case lots the price is 35½ cents. The 72-76 grade per gal. in the ten-ninety-nine case lot is 40¼ cents. The other two lots are 40 and 39¾ cents respectively.

This is the first change that has been made in quotations of any of the refined products for several months and is attributed to the continued heavy foreign demand in conjunction with the growing acuteness of the situation with reference to supplies. Another important reason for the rise is the present shortage of labor.

## Changes in Car Equipment

NEW YORK, May 26—Changes which have taken place this week by the different automobile makers on their models are as follows: Liberty has installed the Stromberg carbureter; Stearns has changed from the quick demountable rims to the straight side rims on both the four and eight, and Willys-Knight has changed to Remy ignition and Zenith carbureter on the eight.

## Plan to Revive Joplin Ore Producers' Assn.

JOPLIN, Mo., May 29—Many producers are beginning to fear that the demand of the Government on the workmen

of our industries will reduce operations that require zinc and lead and so reduce the demand for ore. A half-hearted effort to raise prices last week was unsuccessful and prices are barely steady at \$80 top for blende and the range down to \$70. Production in the Webb City district is falling off and it is said that mines are shutting down and some are for sale.

Production in the Miami field is increasing, there being a larger margin because of richer ore lead. Ore is strong at \$1.90 for top and, producers believing prices will rise following eastern advances for pig lead, efforts are being made to revive the Joplin Ore Producers' Assn. so that operators can gather statistics on their costs of production for government information and so that operators may also have their own information on amount of production, cost of transportation in quantities. Producers want first hand data in view of possibility of government fixing prices. The association has been dormant for a year. P. B. Butler is at the head of the present movement.

## National Automobile Dealers Association Started

WASHINGTON, May 26—The first steps in the formation of the National Automobile Dealers Association were taken last night by the representatives of a number of associations in the large cities, who were here opposing the proposed 5 per cent tax on automobiles.

A committee has been formed, of which G. W. Brown, Milwaukee, is chairman. E. T. Conlon, secretary of the Grand Rapids Association, is secretary. This committee will get in touch with all the associations throughout the country to arrange for a general organization meeting before Aug. 1. At that time the work will be perfected, and permanent officers chosen.

## Pocket Used Car Report Out

CHICAGO, May 26—The Chicago Automobile Trade Assn. is sending out a pocket edition of the thirteenth edition of the Thirteenth National Used Car Market Report. The pocket edition is only for zone 7, which centers in Chicago.

## New Tire Rate Book Ready

NEW YORK, May 29—The May issue of the *Tire Rate Book*, published by the Class Journal Co., has been brought out. This book comes out in January, May and September, and gives the sizes and prices of the different tires, in all their models. It also gives a list of cars and their specifications. In addition to this information, the prices of the chassis equipped with all body types are given.

## Daily Market Reports for the Past Week

Material.	Tues.	Wed.	Thurs.	Fri.	Sat.	Week's Changes
Aluminum, lb.	.59	.59	.59	.59	.59	...
Antimony, lb.	.25	.25	.25	.25	.25	...
Bessemer Steel, ton	85.00	85.00	85.00	85.00	85.00	...
Copper, Elec., lb.	.32	.32	.32	.32	.32	...
Copper, Lake, lb.	.32	.32	.32	.32	.32	...
Cottonseed Oil, bbl.	16.40	16.40	16.40	16.65	16.40	...
Fish Oil, Menhaden, Brown, gal.	.82	.82	.82	.82	.82	...
Gasoline, Auto, gal.	.24	.24	.24	.24	.24	...
Lard Oil, prime, gal.	1.95	1.95	1.95	1.95	1.95	...
Lead, 100 lbs.	10.00	10.00	10.00	11.00	11.00	+1.00
Linseed Oil, gal.	1.27	1.27	1.27	1.27	1.27	...
Open-Hearth Steel, ton	85.00	85.00	85.00	85.00	85.00	...
Petroleum, bbl., Kans., crude	1.70	1.70	1.70	1.70	1.70	...
Petroleum, bbl., Pa., crude	3.10	3.10	3.10	3.10	3.10	...
Rapeseed Oil, refined, gal.	1.40	1.40	1.40	1.40	1.40	...
Rubber, Fine Up-River, Para, lb.	.76	.76	.76	.76	.76	...
Rubber, Ceylon, First Latex Crepe, lb.	.84½	.84½	.84	.82½	.82½	-.02
Sulphuric Acid, 60 Baume	1.50	1.50	1.50	1.50	1.50	...
Tin, 100 lbs.	65.50	65.50	65.50	64.75	64.75	-.75
Tire Scrap, lb.	.06½	.06½	.06½	.06½	.06½	...



## Detroit Section of N. A. P. A.

Purchasing Agents Elect C. T.  
Kingston President—130  
Attend Meeting

DETROIT, May 25—Purchasing agents for concerns in the automobile and parts and accessory lines and others met here last night and formed a permanent organization to be known as the Detroit section of the National Association of Purchasing Agents.

Buyers numbering 130 attended the meeting, which was the outcome of pioneer organization work performed by THE AUTOMOBILE, and 106 signed applications for membership. Many of the others were unable to become members, as the by-laws specify that no buyer who is also connected with the sales of his company can be considered eligible.

The temporary officials, announced in a recent issue, retired and new officers were elected as follows: Charles T. Kingston of the Brennan Boiler Co., president; M. C. Owston of the McCord Mfg. Co., first vice-president; George I. Berridge of Parke-Davis Co., second vice-president; J. Edward Schipper, technical editor THE AUTOMOBILE, secretary; Paxton Mendelssohn of the Fisher Body Corp., treasurer.

The meeting was opened by C. A. Woodruff of the Chalmers Motor Co., who presided as temporary chairman. Mr. Woodruff told those present of the advantages of an organization of buyers, of the need for standardization of catalogs, and stated that he would be very willing at all times to extend his knowledge to the younger members of the association.

Other speakers included E. L. McGrew of the Standard Under-Ground Cable Co., Pittsburgh, Pa., the president of the National Association of Purchasing Agents; E. H. Ridgeway of the Colonial Steel Co., treasurer of the National body; and W. L. Chandler of Dodge Sales & Engineering Co., Mishawaka, Ind.

Mr. McGrew spoke briefly, stating the benefits of organization, which he enumerated as:

1. To exchange ideas and opinions.
2. To promote harmony and friendliness.
3. To familiarize buyers with products.
4. The gathering and distribution of buying information.
5. Establishment of a Central Council of Information.
6. Investigation of products.
7. The support of domestic industry.

He told, also, of the next annual convention of the parent body at Pittsburgh, Sept. 25-27, and extended an invitation to all of the members of the new division.

Mr. Ridgeway discussed the finances of the National body, stating that there was somewhat more than \$500 in the treasury. He explained that the revenue was derived from a part of the division dues, which amount to \$5 for initiation and \$11 for annual membership plus a subscription to the organization's associated organ THE NATIONAL PURCHASING AGENT. In addition, a revenue is derived from the publication which pays the as-

sociation 5 per cent of its advertising income.

Mr. Chandler discussed the standardization of catalogs, and also the large benefits purchasing agents can derive through co-operation. A vote of thanks was extended to Paxton Mendelssohn, Fisher Body Corp.; H. H. Main, Cadillac Motor Co.; T. F. Thornton, Detroit Steel Products Co.; H. R. Viot, Continental Motors Corp.; George Berridge, Parke-Davis Co.; and F. H. Maisonneville, Timken-Detroit Axle Co., for their co-operation with Mr. Woodruff in the organization of the association.

### Eisemann on United Tractor

DETROIT, May 28—The United tractor, made by the United Motors Co. of Grand Rapids, Mich., will be equipped with the Eisemann magneto. In the description of these tractors which appeared in THE AUTOMOBILE for May 10 another system of ignition was specified. Since that time the Eisemann has been adopted.

### Alter Company Declared Bankrupt

PLYMOUTH, MICH., May 28—The Alter Motor Car Co. was adjudicated bankrupt by Judge Arthur J. Tuttle last Friday, and the disbursement of the company's assets was referred to Lee E. Joslyn, referee in bankruptcy. Creditors of the defunct company are the Remy Electric Co. of Indiana, Carr Fastener Co. of Massachusetts, and the General Spring & Wire Co. of Michigan.

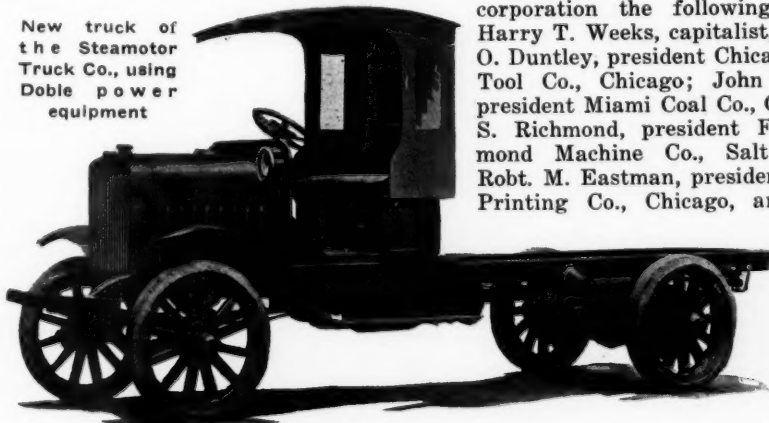
### Kent Motors Petitioned

BELLEVILLE, N. J., May 25—Two involuntary petitions in bankruptcy have been filed against the Kent Motors Co. Both petitions charge insolvency and place the company's liabilities at \$30,000. Both further allege that the concern has committed acts of bankruptcy in that it made preferential payments and disposed of assets within 4 months of the filing of the petitions. The company was incorporated in September, 1916, with capital stock of \$200,000.

CLEVELAND, May 31—James A. Braden has been appointed director of advertising of the Standard Parts Co. He was formerly advertising manager of the Diamond Tire Co.

CLEVELAND, May 31—W. C. Clay has become sales manager of the Abbott Corp.

New truck of  
the Steamotor  
Truck Co., using  
Doble power  
equipment



## F. R. P. Reorgan- ization

Larger Production Requires  
More Capital—Price Increased  
from \$6,000 to \$7,000

NEW YORK, May 25—A reorganization together with an increase of capital, of the Finley Robertson Porter Co., Inc., Port Jefferson, L. I., has been completed. This widening of the activities of the company means a larger production and the introduction of additional capital to make such possible. The capital has been increased from \$100,000 to \$250,000 preferred stock of par value \$100, carrying 8 per cent cumulative, and 10,000 shares common of no par value.

Under the broadened plans of the company production has already been started on a run of 100 F.R.P. cars. The price for the seven-passenger touring car has been increased from \$6,000 to \$7,000. The new cars are different from the old models in that 16-valve engines are used. The general engine design is the same as formerly with the exception of the 16-valve arrangement. Cylinder sizes are 4 6/10 by 6 3/4 and the wheelbase is 140 in.

Finley R. Porter, who has been the directing spirit of the company since its organization, is president under the reorganization scheme. F. D. Veiller is vice-president; and R. C. Kay, of Pittsburgh, is secretary and treasurer. These men with Paul R. Towne, of Harris & Towne, attorneys, and J. S. Stubbs, comprise the board of directors.

The plans of the company include opening offices in this city. It is expected that practically all of the retail sales will be largely confined to Greater New York.

### NEW COMPANIES

TRENTON, N. J., May 25—The Nash Motor Co. has been organized to manufacture automobiles and accessories with a capital of \$100,000. The incorporators are J. L. Brock, H. L. Brock, Verne L. Nash and Elton H. Ertel.

DETROIT, May 26—The Steamotor Truck Co., organization of which was announced last week, will include in its corporation the following individuals: Harry T. Weeks, capitalist, Chicago; W. O. Duntley, president Chicago Pneumatic Tool Co., Chicago; John T. Connery, president Miami Coal Co., Chicago; Fred S. Richmond, president Fred S. Richmond Machine Co., Salt Lake City; Robt. M. Eastman, president W. F. Hall Printing Co., Chicago, and Adelor J.

Petit. Abner Doble, vice-president of the General Engineering Co., Detroit, will also be a director.

BELLINGHAM, WASH., May 26—The Auto Safety Brake Corp. has been incorporated with a capital of \$25,000 to manufacture an automobile brake. F. C. Fraser is vice-president.

NEWARK, OHIO, May 26—The Jewett Truck Attachment Co. has been incorporated with a capital of \$25,000 to manufacture attachments for all makes of trucks. The factory is to be established at Newark. The incorporators are William B. Wingerter, William S. Wright, William Schroeder, Bessie B. Wright and Edward Kibler.

DOVER, DEL., May 25—The Preston Motor Car Co. has been incorporated for \$10,000,000 to manufacture engines.

The Atlanta Motors Corp. has been incorporated for \$2,000,000 to manufacture automobiles and trucks.

SIDNEY, OHIO, May 25—The Buckeye Top Co. has been incorporated with a capital of \$10,000 to manufacture automobile tops. The incorporators are J. A. Manecke, C. G. Carr, Raymond W. Miller, Fred C. Dull and John Oldham.

#### Pathfinder Stock Offered

DETROIT, May 24—A. R. Sheffer & Co., this city, are offering to the public stock of the Pathfinder Co., Indianapolis. The company's 7 per cent preferred stock carries the right to buy the common stock at \$2.50 with a par of \$10.

#### Dividend Declared

Goodyear Tire & Rubber Co., quarterly of 3 per cent on common, payable June 1.

## Security Prices Are Higher

### Strong as Result of Passing of Government Tax—Few Declines

NEW YORK, May 29—A bullish automobile market has sprung up as a result of the dropping of the automobile tax by the government on all automobiles sold by the makers. This action was favorable to the Street and started a flurry in the stocks, causing a substantial rise in prices. Motor shares have held strong during the past few days. Chevrolet sold up to 105, General Motors common up to 110, Miller Rubber to 200, a gain of 15 points, and Portage common up to 150, a gain of 14 points.

Rubber issues in general responded with the largest gains in some time. Ajax Rubber went up 4 points, Fisk common up 3 points, Firestone up 6 points, Goodrich up 2½ points, and United States Rubber common up 1½ points.

Automobile issues, which have been hammered down by the bears, were yesterday borne upward because of the general good feeling as a result of the favorable government action.

#### Automotive Electric Assn. Committees Appointed

NEW YORK, May 28—It is stated to be the hope of the recently formed Automotive Electric Assn. that standardization may be facilitated by a close co-operation between the association and the Society of Automotive Engineers. It is believed that the support of a body

which is largely commercial in its membership will accelerate engineering work along standardization lines, and the standards committee of the association will make its recommendations in conjunction with the S. A. E. committees. There are several members of S. A. E. standards divisions represented on the executive committees of the association which are as follows:

#### STANDARDIZATION COMMITTEE

O. F. Conklin.....Remy Electric Co.  
(Chairman)  
W. A. Chryst.....Dayton Eng. Lab. Co.  
A. E. Doman.....Dyneto Electric Co.  
B. M. Leece.....Leece-Neville Co.  
C. F. Gilchrist.....Elec. Auto-Lite Co.  
C. E. Wilson.....Westinghouse E. & M. Co.  
T. L. Lee.....North East Elec. Co.  
H. E. Stuart.....Robbins & Myers Co.  
A. H. Timmerman.....Wagner Elec. Co.  
A. D. T. Libby.....Splittorf Electric Co.

#### SUB-COMMITTEE ON ELECTRICAL EQUIPMENT FOR AEROPLANES

W. A. Chryst, Chairman  
B. M. Leece  
A. D. T. Libby  
C. E. Wilson

#### SUB-COMMITTEE ON GOVERNMENT TRUCK EQUIPMENT

T. L. Lee, Chairman  
C. E. Wilson  
H. E. Stuart  
A. D. T. Libby

In regard to the plan for handling the patent situation, no final methods of procedure have been as yet formulated. This first requires a complete survey of the field and the position occupied by the various member companies. This investigation is proceeding under a legal and patent committee, representing 11 of the manufacturers of these products. The situation is a very involved one, requiring much labor and the best legal advices, but it is hoped to announce a proposed plan of operation late in August, or in September.

### Automobile Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge		Bid	Asked	Net Ch'ge
*Ajax Rubber Co.	71	74	+3	Springfield Body Corp. com.	52½	57½	+ ½
*J. I. Case T. M. Co. pfd.	847½	86	+ ¾	Springfield Body Corp. pfd.	110	117	..
Chalmers Motor Co. com.	..	30	..	Standard Motor Construction Co.	13	14	..
Chalmers Motor Co. pfd.	..	..	..	*Stewart-Warner Speed. Corp.	74½	75½	+2½
*Chandler Motor Car Co.	92½	93	+6½	*Studebaker Corp. com.	86½	86½	+58
Chevrolet Motor Co.	100	103	+5	*Studebaker Corp. pfd.	101	104	+3
*Fisher Body Corp. com.	34	38	..	Swinehart Tire & Rubber Co.	65	70	+5
*Fisher Body Corp. pfd.	88½	90	+1½	United Motors Corp.	31½	31½	+2½
Fisk Rubber Co. com.	73	76	+3	*U. S. Rubber Co. com.	57	58½	+1½
Fisk Rubber Co. 1st pfd.	103	106	..	*U. S. Rubber Co. pfd.	105½	106	+1¼
Fisk Rubber Co. 2nd pfd.	92	95	..	*White Motor Co.	46	47	+17
Firestone Tire & Rubber Co. com.	130	133	+6	*Willys-Overland Co. com.	29¾	30	+3½
Firestone Tire & Rubber Co. pfd.	106	107½	..	*Willys-Overland Co. pfd.	93½	95	+1¼
*General Motors Co. com.	110	111	+7¾	*At close May 28, 1917. Listed New York Stock Exchange.			
*General Motors Co. pfd.	88	89	+½	OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE			
*B. F. Goodrich Co. com.	52½	53	+2¾	ACTIVE STOCKS			
*B. F. Goodrich Co. pfd.	106	107	..				Net Ch'ge
Goodyear Tire & Rubber Co. com.	207	210	+13		Bid	Asked	
Goodyear Tire & Rubber Co. pfd.	106	107½	..	Auto Body Co.	..	29	..
Grant Motor Car Corp.	4	6	+1	Automobile Crankshaft Corp.	..	..	..
Hupp Motor Car Corp. com.	3	4	+ ¾	Bower Roller Bearing Co.	34¾	..	+1
Hupp Motor Car Corp. pfd.	..	30	..	Chevrolet Motor Co.	96	102	..
International Motor Co. com.	7	10	..	Commerce Motor Car Co.	..	..	..
International Motor Co. 1st pfd.	35	50	+2	Continental Motor Co. com.	7½	77½	+ ½
International Motor Co. 2nd pfd.	..	..	..	Continental Motor Co. pfd.	..	..	..
*Kelly-Springfield Tire Co. com.	51	52½	..	Edmunds & Jones com.	26	29	..
*Kelly-Springfield Tire Co. 1st pfd.	87	94	..	Ford Motor Co. of Canada.	220	240	..
*Lee Rubber & Tire Corp.	18	18½	..	Hall Lamp Co.	..	24	..
*Maxwell Motor Co., Inc., com.	51½	51½	+3¼	Hayes Mfg. Co.	..	..	..
*Maxwell Motor Co., Inc., 1st pfd.	68	69	+4	Michigan Stamping Co. com.	..	15½	..
*Maxwell Motor Co., Inc., 2nd pfd.	32	34	+1½	Motor Products	..	..	..
Miller Rubber Co. com.	200	205	+15	Packard Motor Car Co. com.	..	150	..
Miller Rubber Co. pfd.	104	105½	..	Packard Motor Car Co. pfd.	..	99	..
Packard Motor Car Co. com.	..	150	..	Paige-Detroit Motor Car Co.	29½	31	+ ½
Packard Motor Car Co. pfd.	..	98	..	Prudden Wheel Co.	23½	26	+1½
Paige-Detroit Motor Car Co.	28½	30	-1½	Reo Motor Car Co.	29½	29¾	+2¼
Peerless Truck & Motor Corp.	15	19	+2	INACTIVE STOCKS			
Portage Rubber Co. com.	150	155	+14	Atlas Drop Forge Co.	38	41	..
Portage Rubber Co. pfd.	..	..	..	Kelsey Wheel Co.	..	40	..
Regal Motor Car Co. pfd.	17	21	..	Regal Motor Car Co.	..	26½	..
Reo Motor Car Co.	28¼	29¼	+ ¾				
*Saxon Motor Car Corp.	40	42	+4				

#### OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE ACTIVE STOCKS

	Bid	Asked	Net Ch'ge
Auto Body Co.	..	29	..
Automobile Crankshaft Corp.	..	..	..
Bower Roller Bearing Co.	34¾	..	+1
Chevrolet Motor Co.	96	102	..
Commerce Motor Car Co.	..	..	..
Continental Motor Co. com.	7½	7½	+ ¾
Continental Motor Co. pfd.	..	..	..
Edmunds & Jones com.	26	29	..
Ford Motor Co. of Canada.	220	240	..
Hall Lamp Co.	..	24	..
Hayes Mfg. Co.	..	..	..
Michigan Stamping Co. com.	..	15½	..
Motor Products	..	..	..
Packard Motor Car Co. com.	..	150	..
Packard Motor Car Co. pfd.	..	99	..
Paige-Detroit Motor Car Co.	29½	31	+ ¾
Prudden Wheel Co.	23½	26	+1½
Reo Motor Car Co.	29½	29¾	+2¼

#### INACTIVE STOCKS

Atlas Drop Forge Co.	38	41	..
Kelsey Wheel Co.	..	40	..
Regal Motor Car Co.	..	26½	..



# AUTOMOBILE

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The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

## Teamwork

**T**EAMWORK, in the highest sense of the word, between the United States Government and the great industries of the country, can be effected through the business press. This was demonstrated conclusively at the meeting in Washington last Friday when cabinet members and heads of the various war boards united in explaining the nation's problems to 109 editors of business publications. Every one of these men entrusted with the responsibilities of the war realizes the power of the business press and each one did his best to make every phase of the present crisis clear; to describe the work now going on in preparation for meeting new conditions created by the war; and to impress upon these editors as representatives of the country's industries that winning the war is vital to the future of the United States, and that victory depends entirely upon the hearty co-operation of our manufacturers, miners and other business men.

This must be a war to the finish to insure peace to the world in the future and every day that our business men can shorten the war by active teamwork with the Government means greater business opportunities and a more adequate equipment of men, money and materials with which to take advantage of them. War is waste and when it is realized that this particular war is already costing from \$60,000,000 to \$100,000,000 a day in addition to the daily loss of the lives of 10,000 persons who swell industry's

ranks and profits in times of peace, it is high time for our business men to throw every ounce of their influence, power and energies into the effort to bring it to an early end.

Our Government is doing its best to make our entry into the war a powerful factor in determining the duration of this economic disease, but it cannot make the United States the intensively organized, highly co-ordinated unit that it must be to attain this purpose without the teamwork of the country's business men. War is business in this country to-day and our business is war. The business press feels its responsibility and has already thrown all its power and influence into the work of winning the war by bringing home to our manufacturers, miners, dealers, farmers and other men of business the necessity for teamwork, both with the Government and each other.

## War Business Different

**B**USINESS in the United States during the war will be bigger, but different. This is the consensus of opinion among the men who guard the nation's destinies. Business is already undergoing a subtle transition which may overtake some of our manufacturers, dealers and other business men unawares. These men should prepare for changing conditions.

In the automobile field, decreased production of automobiles and increased production of trucks and tractors seem probable developments. Until the war is won, all our transactions will be affected by war requirements and conditions. An unprecedented volume of production and sales is certain, but this business boom will be practically entirely concerned with necessities of war, life and manufacture.

Every man in the automobile industry should look about him, note the new trends in business and study his own work and his own problem with an eye to the future. Some products that sell to-day may be unessential to-morrow. We must eliminate these non-essentials, decide upon the essentials and concentrate on them.

## Officers' Cars

**T**HE excessive use of touring cars by French officers and the enormous cost thereof pointed out by W. F. Bradley is not a condition peculiar to either France or to armies. A man in a position of authority, who has to move from place to place, turns naturally to the automobile because it is the essentially best means for getting about. It is both quicker and more comfortable than any other form of transportation for short distances. That it can be an excessively costly form is very naturally forgotten in times of stress.

Whether or not it pays to place a car at an officer's disposal must depend upon the nature of his duties and it ought not to be difficult to control the use of cars provided the need for control is grasped at once.

No doubt there will be much waste of this sort in the American army; it practically cannot be eliminated altogether, but advantage can and will be taken of French experience.

# War Means Bigger Business

Nation's Leaders in Crisis Analyze Industrial and Economic Problems Involving Concentration on Necessities Before 109 Editors Representing Business Publications of United States—Co-ordination of Industries Will Win War

Cabinet Members and Heads of War Boards Predict Prosperity If  
Public Turns to Thrift and Eliminates Non-Essentials

By Donald McLeod Lay

**B**USINESS is going to be bigger than ever before, but it will be a business of necessities and we must readjust ourselves to war-time requirements. This is the essence of the message hammered home in Washington last Friday to 109 editors representing the great business press of the United States by seventeen of the nation's leaders in the present war crisis, among whom were five cabinet members and the men at the head of practically every government war board.

From 9 a. m. till nearly 5.30 p. m. these men took up their respective problems in rapid-fire order and in brief, pithy talks laid the whole situation in each field clearly before the men whose duty it is to interpret to the great industries of the country national events and policies. In each case a period of several minutes was devoted by the speaker to answering questions following his address so that every subject was considered from every angle and all the essential facts mastered by the editors before the next speaker took the floor. The comprehensive and intensive program was arranged by the Editorial Conference of the New York Business Publishers' Assn., Inc., of which David Beecroft, directing editor of THE AUTOMOBILE, is chairman.

Taking up the talks in summarized form, Frank A. Vanderlip, president of the National City Bank, New York, speaking on "Financing the War," urged the necessity of thrift, saying that this war must be fought on the savings of the future. Unwise taxes must be avoided and capital and labor must work together for the common good.

The necessity for conservation of gasoline and petroleum in the United States was the subject treated by Van H. Manning, director of the United States Bureau of Mines. He pointed out that it might even become necessary for the government to adopt regulation of passenger cars to insure national safety of the gasoline supply.

Democracy is warring against feudalism in our war with Germany, according to Franklin K. Lane, Secretary of the Interior, who pointed out that military Germany is a real menace to the United States to-day. He likened Liège to Bunker Hill, and Louvain to Lexington, and

drew a vivid picture of our position, should Germany gain control of Canada.

Mobility of labor is one of our great problems, according to Secretary of Labor William B. Wilson, who told of the work his department is doing to settle disputes between employers and workers, and in providing labor for the farms and other important activities, transferring men from unimportant work for this purpose.

Secretary of War Baker outlined the importance of business in modern warfare, and cautioned our industries to expect some confusion and disturbance in adjusting themselves to changing conditions.

Utilization of hitherto wasted possibilities in our natural resources was the theme developed by Secretary of Commerce William C. Redfield. He also predicted a marked increase in foreign trade after the war.

A corn crop three times the wheat yield is our greatest factor of safety in the food situation, according to Dr. Pearson, president of the Iowa State Agricultural College. Only 10 per cent of this great corn crop has been utilized for human food in the past, and more widespread appreciation of its possibilities will relieve the wheat shortage to a marked degree. Dr. Pearson urged the elimination of waste in the home, pointing out that one slice of bread a day in each home in the country means 150,000,000 barrels of flour wasted in a year.

Secretary of the Navy Josephus Daniels urged that no one should make an abnormal profit from the war. He also dwelt on the technical training in the navy and stated that there are now 36,000 engineers busy on naval work.

There is no coal shortage, but the present public panic on the subject must be stopped, said Francis S. Peabody, chairman of the committee on coal production of the Council of National Defense and president of the Peabody Coal Co., Chicago. He also told of the economy effected by pooling arrangements in shipping coal.

Howard Elliott, former president of the New York, New Haven & Hartford Railroad and member of the Railroad Executive Committee of the Council of National Defense, analyzed the seven great problems of the railroads and told how work necessary for effecting



economies in railroad operation is being carried on.

Walter Gifford, director of the Council of National Defense, reviewed the system of intensive organization which the government is developing in the various industries, in homes, stores and factories.

Frank Scott, chairman of the Munitions Board of the Council of National Defense, outlined the severe condition under which firearms and ordnance operate in modern warfare, and told of our preparedness in respect to military rifles, the Munitions Board having arranged for the manufacture of the Enfield type to fit our ammunition.

Stabilization of food prices by government limitation of exports was discussed by Food Administrator Herbert Clark Hoover, who stated that the war is one of attrition and may last two to five years. He urged reorganizing our distributing system and general food economy.

Dr. Franklin H. Martin, medical expert of the Council of National Defense, told of the standardization of surgical instruments, nine-tenths of which were formerly made in Germany. He also mentioned that 1000 doctors are being sent to Europe at the rate of 200 a month and 500 nurses in the same proportion.

Thrift will win the war and will also bring better business, according to Lewis B. Franklin, Liberty Loan Publicity Bureau. Mr. Franklin urged every person in the United States to buy a Liberty Bond, and thus stimulate business, as all of the \$2,000,000,000 raised will be spent in this country.

George Otis Smith, director United States Geological Survey, stated that our mineral resources are keeping pace in output with the increased demand, despite requirements by our Allies of 50 to 100 per cent more metal than last year.

Press, people and government should all work together in this crisis, said George Creel, chairman Committee on Public Information, who assured publishers that no policy of repression is intended and that his committee asks only for co-operation. Detailed accounts follow:

### Business Will Be Bigger But Different—Vanderlip

**B**USINESS in the United States will be profoundly affected by the war. Unprecedented industrial activity will develop, but this will be entirely a business of war, concentrating on the essentials and eliminating the non-essentials.

These facts were brought out clearly by Frank A. Vanderlip, president of the National City Bank, New York.

The war must be fought on the savings of the future, which means that an expansion of banking credit is necessary. As an example of the working out of this idea Mr. Vanderlip told of the great movement now under way in which employers take Liberty Bonds to hold for their employees so that purchase can be made on the installment plan. To carry these bonds employers have undertaken the burden of borrowing from banks.

To emphasize the tremendous meaning of the \$7,000,000,000 now being raised by the United States Government as the first step in prosecuting the war, Mr. Vanderlip showed that the total value of all the railroad stocks of the country is only \$8,500,000,000; all the money now on deposit in savings banks throughout the country is \$5,000,000,000; and all the money in the United States Treasury and the various sub-treasuries is but \$2,000,000,000. Our task is harder than that of England in one way because we are financially self-contained and there is nowhere else for us to go to secure money for waging the war.

Three great lessons will be taught to the United States by the war.

First, the lesson of thrift. We must economize; we must not spend our money for unnecessary things; we must not employ labor on unnecessary things as the manufacture of necessary things will require all the labor available. Wages will be higher as 125 per cent of the present labor supply is already urgently needed. Women and youths will be employed to a greatly increased extent in industrial pursuits. In the transfer of industry from the non-essentials to the essentials the field for necessities will be so much greater than before that the loss of business in the unnecessary things will not be felt.

Secondly, we shall learn that we are fighting for the great principle of democracy. The serious aspect of the situation becomes apparent when we realize that if Russia should make a separate peace, not only would the Teutonic powers receive a new source of supply of everything they need, but in addition to all the German and Austrian soldiers now engaged on the Russian front over 1,500,000 prisoners of war would be released to throw their weight into the struggle on the French and Italian frontiers. The problem of feeding the world and that of overcoming the submarine menace must be solved by the United States.

Thirdly, we shall profit by the experience of inefficiency which will develop under war conditions. These, Mr. Vanderlip pointed out, will teach our citizens their responsibilities and duties to democracy.

To win the war we must have the savings of capital as well as those of labor; we must have prosperous industries to furnish our war finances; we must not impose discouraging taxes; we must apply the burdens which will inevitably accompany the war so that their weight shall be felt only gradually to preserve our industries in a healthful condition.

#### War Boom Will Be Based on Necessities

Frank A. Vanderlip,  
President National City Bank.

#### Must Conserve Our Gasoline

Van H. Manning,  
Director U. S. Bureau of Mines.

#### Use Labor for Essentials

William B. Wilson,  
Secretary of Labor.

#### We Are Fighting for Our Own Interests

Franklin K. Lane,  
Secretary of the Interior.

#### Civilization Depends on This War

Newton D. Baker,  
Secretary of War.

#### War Means Higher Efficiency

William C. Redfield,  
Secretary of Commerce.

#### Eat More Corn to Save Wheat

Dr. Pearson,  
Pres. Iowa State Agricultural College.

#### Make only Normal Profits from War

Josephus Daniels,  
Secretary of the Navy.

#### Coal Plentiful, Must Stop Popular Panic

Francis S. Peabody,  
Chairman Com. on Coal Production, C. N. D.

#### Railroads Adopt Principles of Economy

Howard Elliott,  
Member Railroad Executive Com., C. N. D.

#### Intensive Organization Will Win War

Walter Gifford,  
Director Council National Defense.

#### Our Munitions Supply Is Adequate

Frank Scott,  
Chairman Munitions Board, C. N. D.

#### Food Export Control Will Stabilize Prices

Herbert Clark Hoover,  
Food Administrator.

#### Surgical Instruments Standardized

Dr. Franklin H. Martin,  
Medical Expert, C. N. D.

#### Public Must Finance the War

Lewis B. Franklin,  
Liberty Loan Publicity Bureau.

#### Press Not to be Curbed

George Creel,  
Chairman Com. on Public Information.

#### Mineral Output Keeps Pace with Demand

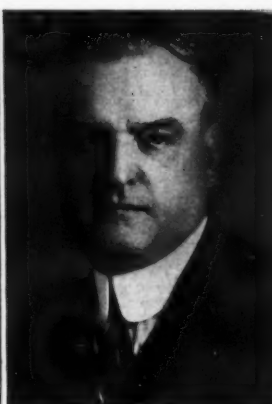
George Otis Smith,  
Director U. S. Geological Survey.



**FRANK A. VANDERLIP**  
Pres. National City Bank



**WALTER GIFFORD**  
Director Council of National Defense



**VAN H. MANNING**  
Director U. S. Bureau of Mines



**HOWARD ELLIOTT**  
Member Railroad Executive Committee



**FRANK SCOTT**  
Chairman Munitions Board C.N.D.

Co-ordination of effort to the greatest possible degree throughout all our economic activities is imperative.

### A War of Democracy Against Feudalism— Lane

**W**E are fighting Germany to-day not so much because of the great injuries we have suffered at her hands, but because we represent a combination of modern democracy and science and Germany a combination of the feudalism of the thirteenth century and the science of the twentieth.

These two combinations of forces are irreconcilable, according to Franklin K. Lane, Secretary of the Interior, whose talk was largely devoted to the fundamental aspects of the world struggle. Germany's system makes for aggressive conquest, irrespective of the methods employed, whether bombing civilians from airships or sinking merchant vessels by submarine torpedoes. We must not take the idealistic view only of this war. Sympathy with the allies is self-interest for if Germany forced England to cede Canada we would have 3000 miles of border always open to attack. America is fighting for real things. This war is as real as the War of the Revolution. Workers make modern civilization and we stand for democracy and against feudalism.

It took us 2 years to realize the meaning of the war. In terms of our own history Liege is Bunker Hill and Louvain is Lexington. We must not forget that France was the first nation to follow our example in adopting the great principles of liberty, equality and fraternity. We taught England what she cannot do to colonies and on this knowledge she based her great Empire of to-day. The new Russia is based on the principles taught by Washington, Jefferson and Lincoln, but Germany has taught us that government by the soldier is not consistent with government by the people.

### Progress and Civilization Depend on the War— Baker

**T**His war will prove whether or not there is such a thing as progress, for civilization itself is in danger. This summary of the situation by Newton D. Baker, Secretary of War, followed his statement that the ruling minds in Germany are so obsessed with the desire for industrial supremacy that all moral balance is lost or withdrawn. All the major points of diplomacy in Central Europe for the past 25 or 30 years have been based on industrial aspirations of the individual nations. The introduction of the military element only intensifies the industrial warfare. War is now a thing of business, industry and commerce, a battle of smokestacks, of the drive wheel and the engine. The United States and its allies are now marshalling their genius, vitality and resources to bring peace to the world and an end to this wasting war which costs \$60,000,000 to \$100,000,000 and over 10,000 lives a day.

We cannot divert into war channels the resources and activities of a nation of 110,000,000 people without creating confusion here and there, jarring habits and causing some

strains in readjustment to new conditions. Secretary Baker urged criticism of a constructive character, but other forms of criticism are useless.

Organizing an army without disorganizing industry is the great task before the war department, but as soon as our industrial activities have been co-ordinated the United States will be in a position to prove the invincibility of democracy and to insure peace.

### Must Not Profit from War—Daniels

**I**T will be a crime for any man to make more profit out of this war than he makes in normal business. We must get this spirit into our people, said Secretary of the Navy Josephus Daniels. The people must regard the navy as belonging to them and must realize the necessity of training men in times of peace to be ready for war.

There are now 36,000 engineers registered and busy on naval work. Experts in all industries are working with Congress and all shipyards throughout the country are working overtime on naval contracts. There is a possibility that ships will be commandeered, if necessary, for naval purposes. To keep the people apprised of these activities, Secretary Daniels endorsed the combination of a free press working in hearty cooperation with a free government.

### Mobility of Labor Our Great Problem— Wilson

**M**OBILITY of labor in connection with mobility of industry is our great problem in entering the war according to William B. Wilson, Secretary of Labor. Modern warfare means the mobilization of labor at the factory far more extended and intensive than the mobilization of the army. Our industrial institutions have developed from the pioneer point of view which fosters individualism, so that our industries to-day are not organized as they should be to meet the greatest crisis in the history of the world.

The standards set up by the industries and workers must be removed and this must be done in consultation between the interests involved as changes mean friction between the workers trying to protect themselves in their industries and to secure good wages and working conditions and the employers endeavoring to meet new conditions.

Peaceful settlement of disputes between employers and workers is even more important to-day than in times of peace and such mediation must be undertaken in a spirit of diplomacy and not approached from a judicial standpoint. To illustrate this Secretary Wilson cited the settlement of the threatened strike in the bituminous coal fields of Central Pennsylvania only 2 weeks ago; shutting down these mines would have caused irreparable injury to the industries of New England, New York and Pennsylvania, would have cost millions of dollars and the price of coal would have gone still higher than it is. The miners were suffering from the increased cost of living and felt that they should share with the operators the benefits of high coal prices, demanding a 33



per cent increase in wages, as miners in other fields had accepted a 20 per cent increase, the granting of the 33 per cent increase demand would have disturbed other fields, reduced the output still further and sent prices still higher. By appealing to the sense of honor of the workmen not to break their contract, by appealing to their patriotism in pointing out the importance of the coal supply for the nation at this time and by asking fair play, such as was observed in the other fields, the Department of Labor mediators headed by Secretary Wilson succeeded in inducing them to accept the 20 per cent increase.

Secretary Wilson told of the work of his department in transferring workers from unimportant work to important activities. He mentioned the registry of 20,000 shipwrights in three or four days by the department for the Shipping Board. The task of finding farm labor for harvest times, he suggested, would be lightened materially if factories would shut down for their annual inventory and overhaul at a uniform time, so that the workers could aid in harvesting. The Department of Labor is urging the development of the old barn-raising principle, the neighborly customs of pioneer times as the best solution of this problem.

### Corn Crop the Great Safety Element—Pearson

OUR corn crop is three times the volume of our wheat yield and only 10 per cent has been used as human food in previous years. This constitutes a great safety factor in the food situation according to Dr. Pearson, president of the Iowa State Agricultural College, who spoke as representative of Secretary of Agriculture David Franklin Houston.

In 1914, Dr. Pearson said, our stock of food was the largest in the world, and crops in 1913, 1914 and 1915 were all very large. In 1916 a reduction was caused by lack of labor, fertilizer shortage and unfavorable climatic conditions. Food prices had more than doubled and the necessity for exportation of food to Europe has been increasing rapidly, exports to Europe having expanded 65 per cent since the beginning of the war.

On May 1 the wheat area in the United States was 21,000,000 acres, or 31 per cent less than last fall. Were it not for our great corn crop we would be facing a very serious situation. As it is we must conserve our food supply to the utmost. The widespread home gardening movement will do much to relieve the situation, but an effort should be made to raise foods for next winter rather than merely summer vegetables, and every section of the country should feed itself so as to reduce transportation demands.

Labor is our greatest agricultural problem and the Departments of Agriculture and Labor are co-operating with the railroads in solving it. The use of tractors is being developed throughout the country to boost the yield and to reduce the expense of cultivation. In New York tractors have been bought from the state agricultural fund. The present labor shortage on the farms is 1,500,000 to 2,000,000 men, due to the fact that for years farmers have been working at a loss

and superior city attractions have drawn the workers away.

To emphasize the importance of eliminating waste in the home Dr. Pearson showed that the total food waste in the families of the United States to-day totals \$700,000,000 a year. The waste of one slice of bread a day in each home in the country means 150,000,000 barrels of flour a year thrown away.

### Food Export Limitation a Price Stabilizer— Hoover

LIMITATION of the amount of food exported will form a powerful price stabilizer, according to Herbert Clark Hoover, Food Administrator. If prices are stabilized the present ever widening margin between producer and consumer will be greatly reduced without injury to legitimate profits. We must reorganize our distributing system, as it is due to our present inadequate methods and facilities that the price of food products is so high rather than because of speculation. We can stop innumerable small leaks in this system without trouble, an example being the return of bread to bakers by dealers, which at present means a waste of 2 per cent. Co-operation of housekeepers would effect a great saving, as will also the increased use of substitutes for high-priced foods, utilization of local products and food substances which cannot be exported, thus leaving more food for famine-threatened Europe.

This is a war of attrition and it may be expected to last 2 to 5 years. Previous to the war our allies had drawn a large part of their food from Argentina, Australia, India, etc. Blockades, embargoes, shortage of labor and other results of the war have tripled crops. We can supply 60 per cent of the food Europe needs and it is possible to increase this by 15 or 20 per cent by right methods. We must restrict exports on the one hand and increase them on the other; this will not be easy but it can be done.

### War Will Strengthen Our Resources— Redfield

ONE valuable effect of the war which is already apparent in the United States is the stimulation of invention and manufacturing genius in developing and producing articles and commodities previously imported from other countries. Secretary of Commerce William C. Redfield in addition to developing this thought, pointed out the more practical and efficient utilization of food and other possibilities and predicted a marked increase in our export trade after the war. We must approach our war problems as if we were alone and our enemy were at his best. Sacrifice and taxes have not yet begun in earnest.

In telling what is being done to prepare for a long and severe war, Secretary Redfield dwelt on the work of his department in introducing new foods such as fish heretofore never utilized, the increased use of corn to relieve the wheat

### Five Cabinet Members Who Addressed Business Editors



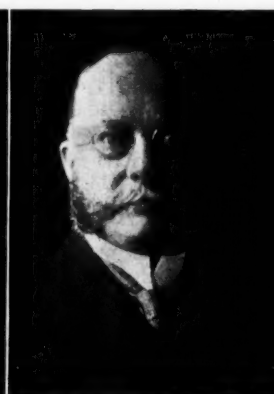
WILLIAM B. WILSON  
Secretary of Labor



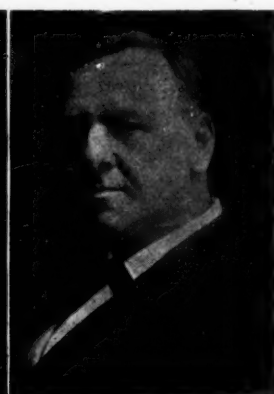
FRANKLIN K. LANE  
Secretary of Interior



NEWTON D. BAKER  
Secretary of War



WILLIAM C. REDFIELD  
Secretary of Commerce



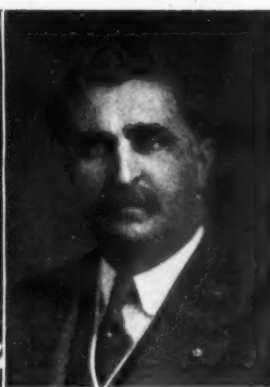
JOSEPHUS DANIELS  
Secretary of Navy



HERBERT C. HOOVER  
Food Administrator



GEORGE CREEL  
Chairman Committee on  
Public Information



GEORGE O. SMITH  
Director U. S. Geological  
Survey

shortage, etc. The development of the dyestuff industry by using local plants, etc., such as the osage orange hedge plant is another result of the war. This particular plant, which was formerly of no commercial value is now being used at the rate of 800,000 lb. a month for yellows, browns, etc., and has entirely replaced fustian, which was previously imported. Kelp is now used for potash, the government is manufacturing optical glass, which we used to buy in Germany and the problem of making chemical porcelain has been solved by the Bureau of Standards and taught to manufacturers.

In regard to foreign trade, Secretary Redfield told of placing a man in Australia to counteract the activities of German agents, who were circulating newspapers published in the United States containing editorials antagonistic to Great Britain, with the idea of injuring our trade in Australia. The act limiting exports now before Congress embodies nothing extreme according to Secretary Redfield, who emphasized strongly the fact that this is not an embargo act. In concluding, he praised the cooperation of the manufacturers.

### Surgical Instruments Now Standardized—

Martin

NINE-TENTHS of the surgical instruments used in the United States Army and Navy were made in Germany before the war, and following the outbreak of hostilities were not procurable. To-day such instruments can be bought in standardized form in any part of the country, according to Dr. Franklin H. Martin, in charge of Red Cross work, medicine and sanitation for the Council of National Defense. Over a year ago 21,000 doctors were selected by the State medical authorities throughout the country as an army reserve, thus forming the nucleus of an organization to direct sanitation and medical work in war.

Until the Russo-Japanese war, Dr. Martin said, more soldiers died from disease than from wounds. At present the need for medical men is greater than any other department of the service, and the medical units have a higher death rate than any other army branch.

A force of 1000 doctors are being sent to Europe at the rate of 200 a month and 500 nurses in the same proportion. Six hospital units each consisting of twenty-four and sixty-four nurses with a total personnel of 196 have already been sent. Our doctors are distributed among the French and English forces to receive training in order to be prepared to work intelligently when our soldiers arrive in Europe.

### Seven Big Railroad Problems—Elliott

OUR railroads face seven major problems. These were outlined by Howard Elliott, former president of the New York, New Haven & Hartford Railroad and now connected in an advisory capacity as a member with the Railroad Executive Committee, Council of National Defense. Mr. Elliott spoke in place of Fairfax Harrison, chairman of the committee. The seven problems are:

1—To move more fuel.

2—To move more iron ore.

3—To modify car service rules to secure more fluid movement.

4—Developing Russian Trans-Siberian Railroad to meet present congested conditions at Vladivostock.

5—To organize nine regiments of railroad men to aid England and France.

6—To perfect pooling arrangements for economy in shipping.

7—To provide adequate food transportation.

Mr. Elliott stated that our 250,000 miles of railroad is an inadequate system for a nation of 110,000,000 people even in times of peace. While there is no serious shortage of transportation facilities at present, there may be such if the war proves of long duration. We must aim to economize our fuel, rolling stock and crews for the transportation of the essentials of life and the necessities of industry.

Passenger schedules are already being revised to prepare for this condition and a bill is before Congress providing the President with power to determine what classes of freight and express shall be given preference.

The Railroad Executive Committee is working closely with the Council of National Defense and the Interstate Commerce Commission and reports once a week to the Council, having been in session practically continuously since April 1. Efficiency circulars have been sent to all shippers and others using the railroads to eliminate waste in shipping and in every other possible way.

The car service commission has been doing valuable work, having formed twenty-three sub-committees. On May 1 the so-called shortage of freight cars consisted of 150,000 cars out of 2,500,000 cars in the country, or three-fourths of 1 per cent. The railroads have done much to add to their equipment, having put into service 989 engines and 44,063 cars so far this year. Orders for 2209 engines and 104,917 cars are on file.

The railroads are preparing for the task of transporting the men of the new army to the mobilization points and when the time comes for this great undertaking everything will be ready.

### Must Plan on Decreased Gasoline Supply—

Manning

IN the face of a large increase in the consumption of gasoline and petroleum in the United States the available supply is rapidly decreasing. Conservation is the only remedy for these conditions now in sight according to Van H. Manning, director of the United States Bureau of Mines. One of the most important factors in the situation is the tremendous consumption of gasoline and lubricating oil in the nearly 4,000,000 automobiles in use. Mr. Manning cited the regulation of passenger cars adopted in England and France as a war measure for the conservation of the gasoline and oil supply and stated that such a step on a modified scale is a possibility in this country.

War requirements will greatly increase the demand for gasoline and oil and when it is considered that the 170,000,000 barrels in stock at the end of 1915 decreased to 150,000,000 barrels at the end of 1916, whereas consumption increased by 13 per cent over 1915. Production in 1917 is expected to be even smaller than 1916 and about 60,000,000 barrels must be taken from the reserved supply of 150,000,000 barrels to meet current requirement. As an example of the rapid increase in the use of motor vehicles Mr. Manning quoted the Federal Trade Commission's report to the effect that the horsepower of automobiles sold increased 100 per cent in 2 years.

To meet this problem Mr. Manning suggested the utilization of other liquid fuels and better methods in production to increase its volume and reduce its expense. In this connection he mentioned the progress made in the use of the cracking process of making gasoline and the reduction of waste by the utilization of by-products. The drilling of new wells must be encouraged and capital for oil development must be forthcoming. The use of kerosene can be greatly increased in motor trucks and tractors although the carburetor problem



is a serious one. The Mexican petroleum yield does not represent any potential factor in the situation as of its total production of 40,000,000 barrels a year 32,000,000 barrels go to the United States. Moreover, whereas the gasoline content of the crude oil produced in the United States averages 15 per cent, the content of the Mexican crude is far lower, ranging from 3½ to 6 per cent.

### Intensive Organization Will Win War— Gifford

**I**NTENSIVE government and industrial organization will win the war. The Council of National Defense has access to the best channels of information through the most prominent men in each industry. This was brought out by Walter Gifford, director of the Council, who told of the work of the Chamber of Commerce of the United States in forming local committees to help the quartermaster in each section, the munitions board, coal production, transportation, shipping board and other forms of definite organization, which signify order instead of chaos. Among these, Mr. Gifford mentioned the women's defense work and commercial economy boards. The latter is cutting down on waste in bread returned to bakers by dealers, eliminating the unnecessary and expensive details of style in clothes and shoes and promoting other important national movements.

### Thrift Means Better Business—Franklin

**T**HRIFT will bring better business and the American people must save enough to help finance the government in this war. These facts were emphasized by Lewis B. Franklin, representing R. W. Wooley, director of publicity of the Liberty Loan. The present volume of business is unprecedented, said Mr. Franklin, and the money necessary for carrying on the war cannot be obtained from the banks without hurting general business and impairing credit.

The Liberty bonds should be in the hands of people and there is an imperative necessity for the financial support of every man, woman and child, financially able to participate, even in the smallest degree, in floating the loan. Every month that the war is shortened by a successful end will save business a corresponding amount and it must not be forgotten that all of the \$2,000,000,000 to be raised by the loan will be spent in this country and cannot but have a stimulating effect upon the business.

### Press Carries Great Responsibility—Creel

**G**EORGE CREEL, chairman Committee on Public Information, dwelt on the extent of the power of the press and urged that publishers feel their responsibility in the same proportion. There is no policy of repression intended, said Mr. Creel, and no mandates are issued by his committee—only advice. Criticism or comment are not to be withheld from publication.

Publishers are asked to suppress only specific facts which may prove of value to the enemy, such as information on the movements of ships, troops, etc., In conducting the war Mr. Creel is urging a close partnership between people and government with all acts and policies of the government clearly known to the public.

### No Coal Shortage But a Coal Panic—Peabody

**T**HERE is no shortage of coal, but the panic of the public with regard to coal must be stopped. Too many people want their coal all at once, said Francis S. Peabody, chairman of the Committee on Coal Production of the Council of National Defense and president of the Peabody Coal Co., Chicago. Mr. Peabody likened this condition to a run on a bank and emphasized its needless and harmful character.

Touching the work of his committee he mentioned five strikes settled in a week, thereby increasing the coal production in the area affected 12,000 tons per day. Due to the work of the committee production in the Pittsburgh field has increased from 51½ to 70 per cent daily and in Franklin, Pa., from 55 per cent to 72 per cent per week.

To facilitate coal shipments practically all railroads have pooled their cars. These arrangements being temporary due to the war emergency. On Thursday, May 31, a conference of all coal shippers in New York will be held to expedite coal shipments in the tidewater section from Newport News to Maine.

The Northwest is a month behind its coal schedule because of the ice. Argentina can get plenty of coal from this country, but must furnish the ships to transport it.

### Mineral Resources Are Ample—Smith

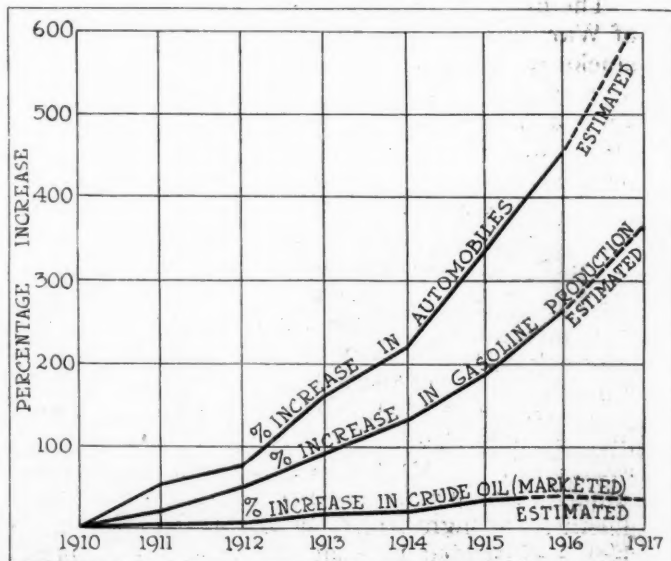
**I**NCREASED yields in the development of our natural resources are keeping pace with the extraordinary demands imposed on practically every field of mineral industry. George Otis Smith, director of the United States Geological Survey, made this statement pointing out that it was the more significant in that the demands of our allies for mineral products are 50 to 100 per cent greater than last year. Our largest war profits, said Mr. Smith, are higher ideas and ideals and although the mineral content of the ore is lower to-day than was formerly the case, the output is correspondingly larger.

The topographical corps of Mr. Smith's department is already working under jurisdiction of the war department and Mr. Smith pledged himself and his 900 associates to aid our manufacturers in any way they may request.

### War Means Men, Metal, Machinery and Money —Scott

**M**ODERN war is made up of men, metal, machinery and money and two of these essentials, metal and machinery, form the work of the Munitions Board of the Council of National Defense, according to Frank Scott, chairman. Contrasting the difference between conditions at Gettysburg and those at Verdun, Mr. Scott mentioned that in the greatest battle of the Civil War, 80,000 men in the Federal Army had 320 guns which fired 32,726 rounds in three days. At Verdun the same number of guns fired a corresponding amount of ammunition in 7 min. General Sherman's entire supply of Field Artillery ammunition, intended to last from October to January on his march to the sea, could be fired by the same number of modern guns as he had in 10 min. Formerly cannon were little affected by use, now cannon must be withdrawn regularly from the firing line to be repaired. In the Civil War projectiles were made of cast iron, requiring little or no machining. Modern shrapnel undergoes fifty-three machine operations before it is ready to load.

The munitions board is aiming to eliminate competition  
(Continued on page 1043)



Percentage increase in crude oil marketed, gasoline production, and in number of automobiles in use from 1910 to 1917, charted by Van H. Manning, Director U. S. Bureau of Mines

## "Business as Usual" Slogan Is Criticized

THE too general use of the "business as usual" slogan by different industries is being criticized not only officially but in banking circles and in many industrial circles as well. These criticisms are generally based on the indisputable facts that we are at war, that we are engaged in a serious war, that we are engaged in a war that will not be over in a few months, but that it will be fortunate if the end comes in a few years.

### Business Must Change

War is an unusual business. The present war is of such stupendous proportions that it demands the entire energies of our country. The present war demands the entire co-ordinated business energies of our country. The fact that we are in war makes business unusual rather than usual. It is impossible for business to remain as usual with the present war.

The fact that business is unusual and will be unusual does not mean that business will be restricted or of reduced volume. Rather, the increased demands and the proportionate shortage of labor mean that business will be greater, that there will be a greater demand for labor, that there will be more money in circulation, and that business will be good—but, business will be different, business will be better, business will be more efficient. It will be a business of essentials, and hence a stronger business, a more enduring business, a more modern business.

The present war has been described by Secretary of War Hon. Newton D. Baker, as a war of smoke-stacks rather than a picturesque war of field combats with banners flying and drums beating. A war of smoke-stacks means a war of industries, and a war of industries demands an economic co-ordination of these industries.

The biggest industries in the country in many cases are not doing business as usual, but are increasing business and adapting it to the newer conditions brought about by war. Witness the railroads which are meeting as a unit and pooling their interests in many regards in order that the high peak of transportation and shortages in such commodities as fuel, food products, etc., can be properly handled. This is unusual business. With railroads it is not business as usual, but business unusual, business in a newer sense, a newer rule of business brought about by the exigencies of war. Not a restricted railroad business, but a changed railroad business and a greater railroad business.

So with many industries. They will not be as usual. They will be unusual. They will be

changed. They will be adapted to suit the exigencies of the war. A recent utterance on this changing of business conditions and a criticism of this "business as usual" slogan, comes from Edward A. Filene of Boston, who is a director of the United States Chamber of Commerce, a member of the permanent committee on International Chambers of Commerce, and president of Wm. Filene's Sons Co., large department store in Boston. Mr. Filene, in criticizing the "business as usual" slogan, says:

"The needs of war—the needs of the country, will fully employ every capable man and woman. War will produce more new business than any practically possible economy can curtail. But the length of the war—the rapidity with which victory will come—will depend on what kind of products our people are working on.

"I am not in sympathy with such appeals as are being spread broadcast urging people to keep right on spending as usual and branding economy as a sort of business treason. I do not for one moment think that such appeals are prompted by selfish motives. There is no class of men who, in my judgment, are more ready to make patriotic sacrifices than business men.

"The campaign for 'business as usual' has been launched by men who sincerely fear that widespread economy will cripple the war power of the nation by cutting down the volume of business, reducing the demand on producers, throwing men out of employment, and disturbing the business and financial morale of the country generally.

### Business Has But One Job

"But while I recognize the patriotic purpose back of the 'business as usual' slogan, as a policy I regard it as unsound. It will prolong the war and hamper the fighting effectiveness of the nation every day it is practised. Business has but one job to-day, and that is *to do the thing that will bring victory at the earliest possible moment. And business cannot serve two masters. Even before the war our productive capacity was taxed to the limit. We simply cannot fill all the added demands of war and at the same time satisfy all of the appetites of peace. Our job is the business of war, not 'business as usual.'*

"War demands not only an organized army, but an organized nation as well. And both must be organized to the same end. Looms that are turning out cloth for sport skirts should be employed, if needed, to furnish uniforms for soldiers.

"The question America faces is just this: Shall



the voluntary economy of the people make it possible for all American business to become essential business, or can that end be reached by drastic Government action only, and after a long period of wasted life and money and needless inefficiency? We have enormous resources, but they are not infinite. We will be obliged to examine all production and selling in the light of its ultimate contribution to the winning of the war. If business becomes a slacker through holding on to non-essential producing and selling, it will have to be conscripted for essential service.

"If people heed the call of 'business as usual,' and spend just as they did before the war they will be helping to bring about a rise in prices and increased taxation, in this way: The Government will need a vast amount of supplies from factories already rushed with orders. If ordinary personal demands are keeping the factories busy, the Government will be obliged to compete with its own people in the prices it pays. This will force a rise in prices, and if the Government is obliged to get its supplies on a rising scale of prices it is clear that the purchasing power of the Government which the people put in its hands through bonds and taxes, will run out just that much more quickly. The re-

sult will be more bond issues and additional taxes which will, of course, come out of the purse of the people.

"It is to the credit of the spirit of some who preach 'business as usual' that they base their plea partly upon the fear that economy will throw many people out of employment. Some have visions of hundreds of salespeople being thrown out of our big stores, skilled workmen searching for jobs; in fact, labor in general demoralized. But the fact is that there will be more than enough work for all. With the prospect of 2,000,000 being withdrawn from business and industry for the army, and with the enormous added demands for war supplies, the outlook is that our problem will not be finding jobs for workers, but workers for jobs.

"And above all a régime of economy will do our notoriously wasteful nation a lasting good. It will do 'democracy's willful stomach' good to go on a wartime diet. It will reduce the waist line, clear the eye, and harden the muscle of the nation. We have the chance to shift our whole national life from an extravagant to a healthy and sane basis at a time when unusual Government demands will make up for the curtailment of individual expenditure and prevent business disaster."

## Business Will Be Bigger But Different

(Continued from page 1041)

between army and navy buyers, buyers for our allies and industries that must be sustained. The board can put government departments quickly in touch with manufacturers able to furnish the necessary materials.

We have enough Springfield rifles for our first army of 500,000 men and for further requirements the munitions board has provided for the manufacture of the Enfield rifle to use our ammunition.

The greatest problem of the Munitions Board will be furnishing contingents for 1,000,000 men by September. This corresponds to building thirty-two cities with an average population of 30,000 men each, including provisions for sewage, water supply, lighting, etc. Hurry-up contractors will get the work and materials and men are already being mobilized to push it to completion.

### Novel Heavy Fuel System for Fords

A NOVEL heavy fuel outfit for Ford cars is about to be placed on the market by the California Vaporizer Co., Los Angeles, Cal. The system is best followed by reference to the illustration. The upper manifold which receives the exhaust from the cylinders in the usual way has a central chamber containing the vaporizer proper. This is merely a cast iron cylinder with fins on the outside and open at the bottom. Immediately beneath is the intake manifold and the carbureter.

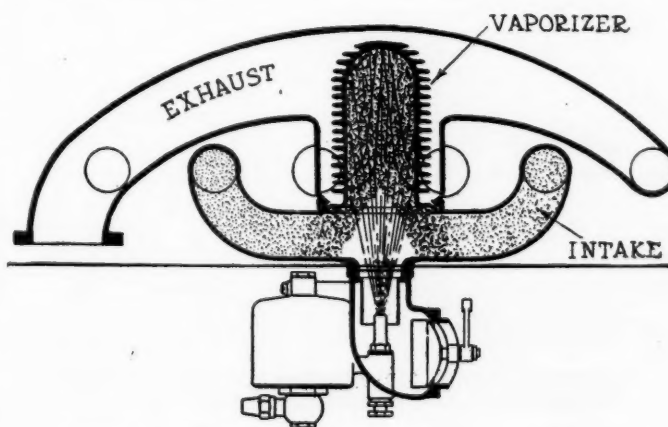
The theory of the action is that the fuel issuing from the carbureter nozzle throws its spray far up inside the vaporizer. In other words, the column of air sucked into the intake manifold has a core consisting of drops of liquid. A high velocity is used and the nozzle is designed to break up the fuel as much as possible.

Any liquid striking the surface of the vaporizer is at once boiled off or turned into vapor and it is claimed that the air passing up either branch of the manifold draws its supply of vapor from the heating chamber instead of carrying actual drops of liquid into the cylinders.

According to the description received from the manufacturer, the throttle is placed on the atmosphere side of the nozzle and thus occupies the position usually taken by the starting 'choke. This is always possible if the air space above the fuel in the bowl is connected to the inside of the manifold instead of open to the atmosphere, and presumably this is the arrangement with the California instrument.

One of the claims is that the power of the engine is not reduced because the air is not heated. The makers state that direct measurement of vapor and mixture temperatures show that with kerosene as fuel the temperature in the mouth of the vaporizer varies between 320 and 370 deg. Fahr., while the temperature of the mixture measured at the valve port varies between 175 and 150 deg. Fahr.

It is further stated that there is practically no variation in mixture temperature, whatever the throttle opening and the speed, because the vapor in the vaporizing chamber is at all times saturated. The vaporizer is stated to operate equally well with kerosene, gasoline or California distillate.



Section through California heavy fuel vaporizer for Fords

# Industry Will Lose Few Men

Automotive War Work Mainly in the Shops, Zimmerschied Tells Detroit S.A.E.  
—Different Military and Naval Requirements Itemized—Government Control of Everything Will Increase

ADDRESSING the Detroit section of the S. A. E., May 26, K. W. Zimmerschied described in detail what the automotive industry would have to do in war. He forecast a gradual increase in government control of civilian life during war time, but predicted that the automotive industry would only have to provide a small number of men for actual fighting, since the majority even of military age would be needed in the factories more than in the field. Mr. Zimmerschied is particularly well able to speak on these subjects, since he is now in charge of the S. A. E. office in Washington, established to enable the society to work for the government with the greatest expedition.

Talking on general matters, after the formal address, Mr. Zimmerschied gave the diagram, Fig. 1, as an illustration of the manner in which governmental control increased with duration of war.

## Effect of War on Industry

In the first stage, *A*, the military activities are a small part of the total; civilian activity for the military represents another small part of the whole, and natural activities are not much curtailed. Government control affects little but the strictly military.

Later, in stage *B*, the sum total of the activities shows a marked increase. Natural activities, however, have decreased. Military activities, and activities affecting the civilian, have shown a great increase, as has government control. This is the stage where government control is placed on gasoline, passenger car use, and the like.

In stage *C*, though the sum total of activities has materially increased, a still further decrease is noted in the natural activities. All other activities show an increase, as does government control.

1—*The Effect of Conscription.* Every man from 21 to 31 will register, which means about 250 out of 3,000 inhabitants;

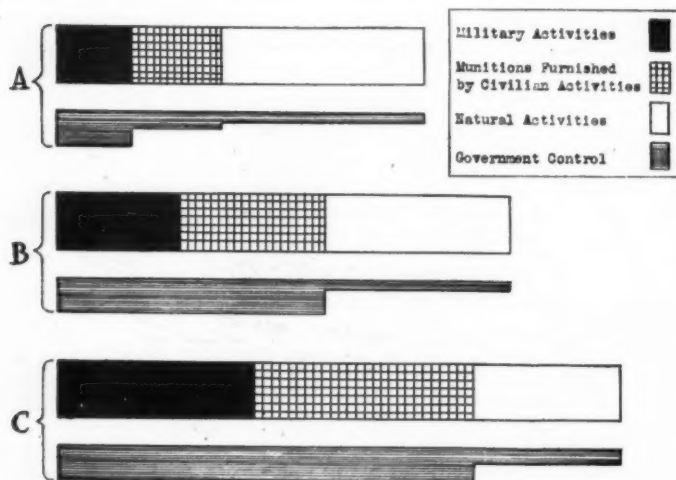


Fig. 1—Diagram of the three stages in organization and condition of a country at war

that is, one man out of every ten or twelve. On this basis there is little danger that the automotive industry will be seriously harmed by the draft. The possibility for harm is still further decreased by the fact that anyone necessary to the industry may be exempt—and considered to be giving service equivalent to service on the firing line. This has been the practice in England and has been found very satisfactory.

The following are some of the figures estimated on a basis of 5000 men: Out of 5000, 2000 will register. Of this 2000, 200 will be drawn. Of this 200, 20 might possibly be exempt because of manufacturing necessity. Hence out of a plant employing 5000, the chances are that not more than 200 will be drawn.

2—*The Raw Material Market.* All disposition of raw materials is subject to the action of the priority board, which is under the council of national defense. This board first looks out for military need, examines cases of complaint, and orders sources of supply to furnish the raw material as deemed necessary. The Interstate Commerce Commission is working in harmony with this board.

Though the priority board is at present chiefly interested in material directly related to munitions, it may later interest itself with the more remote sources of raw material. Under this head would come tractors, farm implements, etc., as affecting the food supply. Also, it would not permit any source of livelihood to be destroyed by war conditions, thereby throwing any one community into dependence.

## Fixed Priority Policy Not Possible

No fixed priority policy is possible because conditions vary from time to time. This board is co-operating with the French and British, and while conditions are not the same in all three countries, this commission will see that the American industry is protected.

3—*The Place of the Industry in War.* To-day the automotive industry is vitally necessary to the carrying on of war. It holds the key to the transport situation and renders a quick movement of troops and supplies possible. The first question the industry is asking is how much material is needed and where is it needed.

The Quartermaster Corps uses two types of general purpose trucks—type A of 1½-ton capacity and type B of 3-ton capacity. Due to the construction, the overload capacity of type A is 3-tons, and of type B, 5-tons. A complete booklet describing the specifications of these trucks is now ready.

At present from 35,000 to 40,000 of these trucks are to be used, in the ratio of six type A trucks to one type B.

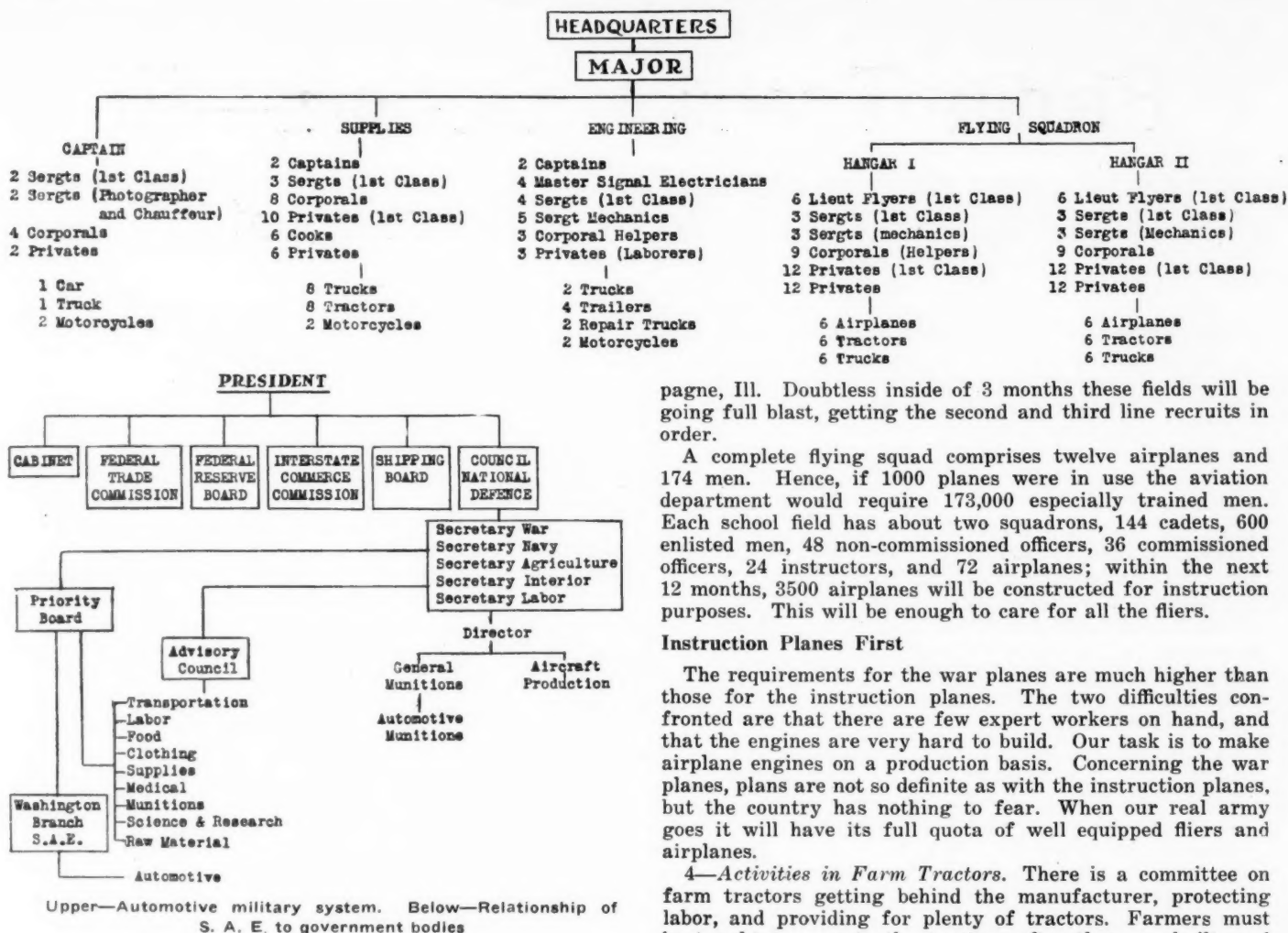
In the ordnance department the requirements for trucks are different. Any truck mounting armor plate is considered to belong to the ordnance department, as well as tractors for guns, a few armored cars, and tanks.

Armored cars have not proven satisfactory in the present war. Tanks have been more so, but must be developed. The first British models bear about the same relation to the tanks of to-day as did the first automobile to the present-day car. A board consisting of three army officers and one civilian is at present making tests on some government tanks, and the American tank will be developed as fast and as well as circumstances permit.

Each division of 28,000 men will require 625 trucks, forty-eight ambulances, and twelve airplanes.

The Engineer Corps uses trucks about the same as the Quartermasters' Department. These constitute wrecking, erecting,





and specially equipped trucks suitable for bridge building and other engineering work.

Under the Signal Corps is the Aviation Corps; hence the Signal Corps uses many trucks of the Quartermaster type, trucks equipped with wireless, trucks for raising and lowering captive balloons, repair trucks, trailers, and airplanes.

Though there has been no little fear and speculation on the development of the airplane in the United States, there is little cause to worry. Progress has been slow but taken up in a logical manner. The first problem was that of getting pilots, next to get machines in which to teach the pilots, and third to get a sufficient supply of war planes.

#### Military Training Essential

Experience on the continent has proven that military training is the first requirement in the development of an aviator. Particularly in the Canadian contingent this was not done at the beginning of the war, and it was found that the fliers were too independent and lacking military training. The flier must first be a soldier and next an aviator.

Aviation schools are being founded all over the country. There will be schools at Berkeley, Cal., Cornell University, University of Texas, University of Illinois, University of Ohio, and University of Massachusetts. At present the course lasts from 1 month to 6 weeks, though later it will extend through a period of 2 months. The student receives instructions in meteorology, aero-dynamics, physics, and on about twelve subjects at the basis of flying. At the same time he is receiving military training and preliminary instructions in flying. There are some few university graduates who have had this preliminary training. These were accepted by the aviation department and are now in the existing schools.

Funds have been appropriated for many fields to be used in airplane instruction. The three first are the Joy field at Mt. Clemens, a field at Dayton, Ohio, and another at Cham-

pagne, Ill. Doubtless inside of 3 months these fields will be going full blast, getting the second and third line recruits in order.

A complete flying squad comprises twelve airplanes and 174 men. Hence, if 1000 planes were in use the aviation department would require 173,000 especially trained men. Each school field has about two squadrons, 144 cadets, 600 enlisted men, 48 non-commissioned officers, 36 commissioned officers, 24 instructors, and 72 airplanes; within the next 12 months, 3500 airplanes will be constructed for instruction purposes. This will be enough to care for all the fliers.

#### Instruction Planes First

The requirements for the war planes are much higher than those for the instruction planes. The two difficulties confronted are that there are few expert workers on hand, and that the engines are very hard to build. Our task is to make airplane engines on a production basis. Concerning the war planes, plans are not so definite as with the instruction planes, but the country has nothing to fear. When our real army goes it will have its full quota of well equipped fliers and airplanes.

4—*Activities in Farm Tractors.* There is a committee on farm tractors getting behind the manufacturer, protecting labor, and providing for plenty of tractors. Farmers must be taught to operate the tractors after they are built, and neighbors not individually having farms large enough to merit a tractor will be grouped together to use a community tractor. It is estimated that the tractor will increase the grain yield 500,000,000 bushels. This will be 50 per cent increase of the maximum 1917 production. In addition the Department of Agriculture is working night and day and co-operating with the British.

In closing, Zimmerschied stated that vast problems are confronting us—that mistakes will be made—but in the end we shall come out three times the victors.

#### Electric Refuse Trucks Economical

GOOD results are being obtained in England by the use of electric trucks for refuse collections. Five 2½-ton vans are employed, and these, in 15 months have dealt with 12,741 tons of house refuse, at the rate of 849 tons per month. In the days of horse haulage this would have necessitated the employment of five additional horses and carts at an extra cost of \$4,550 per year. The total mileage covered by these trucks was 28,825. The cost per ton of refuse collected was 92 cents, compared with \$1.54 per ton with horses and carts. The total cost per mile, excluding wages and capital charges, was about 8½ cents.

#### Fabric Pads for Air Bags

AIR bags stretch in use; that is, they become longer and consequently smaller in diameter. To equalize this it is necessary to employ a pad; otherwise the strain on the bag is likely to crack it. A satisfactory pad can be made from one ply of fabric, 20 in. long and 4 in. wide. On top of this should be laid two thicknesses of gum, 1/16-in. gage. Soap-stone the pad well and cure it for 70 min. in an old casing, using an air bag. A pad made in this way will last a long time.—D. R. Cain, Instructor, Goodyear Tire & Rubber Co., School of Tire Repairing.

# Farm Tractor Design—III

## Wheels and Other Forms of Drive

*This is the third of a series of articles dealing with the problems to be overcome in producing the vast quantity of tractors essential for increasing the world's food supply. The first article pointed out that a big market awaits a good tractor, that the engine is the principal unit, and that it is not possible to set a definite price limit. The second dealt with engine problems and how heavy fuel will affect design in the future.*

By A. Ludlow Clayden

GENERAL questions of tractor design, and particularly the sort of engines desirable, were discussed in two previous articles. In these matters, while the writer's opinions will not be shared by every one, they are based upon consideration of well-established facts. When we come to discuss the design of tractor transmissions, to the layout of the wheels or the substitute therefor, and suchlike subjects, it is impossible to avoid a plunge into the realm of speculation.

In road vehicles we have had front and rear wheel drive, we have had two, three and four-wheel layouts, we have had four-wheel drive. Time has proved that we can make successful machines of all types, and that each type has its special sphere of usefulness. So with the tractor, the multifarious methods of driving may easily all persist; that any one form will oust all others is extremely improbable, however far into the future we may peer.

### Natural System Perhaps Not Best

Because the four-wheel machine with rear-wheel drive has proved to be the best for most road work, an engineer naturally turns to the same system for a tractor, unless he has ideas that lead him away from it. He will use this system unless there is a very good reason for not doing so. But it does not follow that this is the best general system for tractors. It may be that it is, but we ought not to be in too much of a hurry to believe it merely because of past experience with road vehicles. Nor should too much weight be given to the fact that those tractors which are conspicuously the best engineering jobs to-day have, most of them, the four-wheel, rear-drive layout.

In road vehicles we do not have to trouble much about the weight on the driving wheels either way. That is, we can be sure of enough to give traction, and the road is normally hard enough to support a considerable pressure per square inch of surface. With a tractor, both traction and unit pressure are important; in some instances they are of paramount importance. It is accepted by nearly all tractor engineers that there is certain agricultural work which can be done better by a track-

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- 1—Drive offers new engineering problem.
  - 2—Four-wheel layout perhaps not best.
  - 3—Road use requirement complicates design.
  - 4—Study conditions abroad very closely.
  - 5—Don't delay trial of new ideas.
- 

laying type than by any other machine, because it gives the maximum traction with the minimum unit pressure. Where the advantage of the caterpillar really begins to be offset by the greater simplicity of the wheeled machine is the big question, and to decide it will take some years.

Between the two-wheel drive, on the one hand, and the tracklayer on the other there is room for all sorts of compromise. There are machines with a chain-tread drive, and wheels for steering which support a good deal of the weight. There are the so-called drum machines, with essentially one hugely wide wheel; there might conceivably be six or eight-wheel machines. Because these things have not proved good for road work is no reason against their adaptability for the farm.

The tractor is the first self-propelling machine that has ever been manufactured, except on the assumption that it would have some variety of prepared track to carry it. In developing the automobile, railroad experience was of little value because the differences of condition were too great; they are, in actual fact, almost as great between the tractor and the automobile as between the automobile and the locomotive.

### A Two-Purpose Machine

The matter is complicated still more because the tractor has to be a road as well as a field machine. In Europe, where the majority of roads are very smooth macadam or bituminous, a tractor cannot be run on them, unless it has smooth wheels, without doing terrible damage. It is illegal in England to drive on a road with strakes or studs in the tires, and it soon will be in America, without doubt, at least on improved highways. Thus the design of the average tractor will have to be some sort of compromise between the road ideal and the field ideal. Meanwhile, there is opportunity for ingenuity in devising some method for rapidly converting a wheel from rough to smooth, and vice versa. Two schemes suggest themselves which have not yet been worked out so far as the writer is aware. One is to attach the studs or tread bars to a loose rim which could be slipped over the smooth rim and held by a half dozen large bolts; the other to provide a smooth rim which



would go right over the wheel with its field tread, and be held similarly by a few bolts. The latter would probably be the better scheme, because the tractor would not have to carry the field-service rims while on the road, as separate parts; and the larger diameter, which equals an increase in gear, would be an advantage on the road more than otherwise.

The writer has mentioned this idea to several tractor engineers, and some seemed rather amused at the thought of any such "complication." The particular idea may be worthless, but for export, at least, the underlying principle is really of very great importance. Remember that in Europe the fields are small, and to get from one to another passage over the roads is necessary. This means that if a tractor works in three fields in a day, as it may easily be required to do, the tread bars and studs will have to be put on and taken off three times, the time occupied being just so much dead waste. The complication of detachable rims, or some corresponding device which could be put on or removed in a matter of minutes, could easily save a couple of hours in a day, and think what two hours means in terms of work the tractor could be doing.

#### Avoid Misleading Simplicity

However, this is a digression. The main idea which it is desired to impress is that the mechanical simplicity and efficiency of two-wheel drive for road vehicles, while it has the same advantages for a tractor, has corresponding disadvantages not apparent on the road. The army wants a certain number of four-wheel-drive trucks because they alone will do certain work; it wants some caterpillars, also; it even has limited use for wheeled tractors, although it wants infinitely more two-wheel, rear-drive trucks than anything else.

To give an instance of how the unexpected may occur, it was recently stated in a British paper that it had been found most economical to use a small tractor put on plowing in hilly country after the fashion of the old steam plow. The tractor was fitted with a winding drum and run across the field, leaving the plow behind at the end of a wire rope. Then the winding drum was used to haul the plow, the tractor run back again to the other end and the plow hauled across once more. Apparently the reason for this system being used was the amount of power absorbed by the tractor itself on the upgrade. It is not suggested that such a system is likely to be anything but a makeshift, but it is possible, if not probable, that something of the sort may be best for small fields on steep hillsides, and some of the richest soil in Europe is found in places where the configuration of the land compels the fields to be small.

#### Foreign Conditions Different

The conditions in Europe are very important now because Europe is looking to America to supply the large quantity of tractors required during the next few years. A tractor built for efficient work in Iowa or Illinois will have but a limited application in England and in very large tracts in France. If American manufacturers study foreign conditions, and devise machines to suit them, they have a much better chance of holding the tractor trade in their own hands after a few years of peace. Now is the time to follow up closely the machines being shipped abroad, for there will never again be such an opportunity for watching them work under varying conditions, varying soils, varying desires on the farmer's part, preparation for every conceivable kind of a crop.

That Europe will demand the perfection of a smaller machine than America can use most expeditiously is

more than probable. Experience in the U. S. and Canada will be of greatest value in developing the four-plow and larger tractors, but Europe will be the place to develop the three and two-plow outfits.

#### Traction and Weight

This brings up another question of detail concerning which we really know very little indeed, namely, how to get the greatest pull with the least weight. The studs, tread bars, or strakes, as they are variously called, fitted to the rims of driving wheels, must necessarily vary according to the nature of the soil. To get the most economical expenditure of power we need the minimum roughness on the wheel which will give the grip. At present, the gravest difficulty is to get enough grip, as, for example, on a grade where the ground is covered with rotting vegetable or animal matter which will form a lubricating compound when squashed. Is it not possible that there may be room for a device somewhat akin to the feathering paddle wheel used on boats? The pedrail has been largely set aside with the coming of the caterpillar, but this is no reason why it should not have its sphere; do not let it be forgotten.

Of course, the present is not the time to disturb production for the sake of experiment, but in the effort to turn out as many as possible of the best tractors we have there is a danger that we may lose sight of the fact that the present huge demand is due to the abnormal state of the world's food supply. War has made the tractor industry increase ten times as fast as it would have done in peace time.

#### Must Continue to Experiment

In aircraft we have seen an enormous production going hand in hand with an equally astonishing improvement in design. Things are being done in the air to-day utterly impossible even two years ago. This is because manufacturers, while building to the utmost capacity of their plants, have still continued to experiment with new ideas. So, with the tractor let us continue experiment for greater efficiency, for less weight, for more traction, for more economical operation. It is, even in present circumstances, better to put 10 per cent of our energies into development and 90 per cent into production than to put the whole 100 per cent into production and let development slide. The 10 per cent of energy in experiment will be returned with compound interest within a couple of years or less.

It is in general layout that experiment seems to offer the best promise just now. The engines we have are good enough, the transmissions are good enough; ordinary soundness of engineering and workmanship will insure against mechanical breakdown in any part. It is in the utilization of the power available that the greatest opportunity for variation is to be found, and there is herein enormous scope for inventive ingenuity.

#### Kerosene Shows Hidden Defects

**K**EROSENE will show defects that may be present but are not visible.

In order to make this test first remove all grease and oil and then give the part to be tested a bath in kerosene. Now wipe the surface as dry as possible with clean waste. The next thing to do is to jar the piece and the shock will cause the slightest crack, even those due to crystallization, to reveal itself. Kerosene will enter the slightest crack or hole and the jarring will force some of this kerosene out of the crack, thus indicating the place where the material has been weakened. The same method can be used for new shafts or axles to make sure that no defects exist.

# Engineering in Spark Plug Design

History of Ignition, Details of Plug Manufacture, Materials and Mounting Subject of Champion Before Indiana S. A. E.

**A**T a meeting of the Indiana Section of the Society of Automotive Engineers held at the Hotel Claypool, Indianapolis, May 25, Albert Champion of the Champion Ignition Co., Flint, Mich., delivered an address on the engineering phases of spark plug design. Mr. Champion went back into the history of ignition and then traced the developments from the earliest types of internal combustion engines up to the present time. He led the audience through the processes of manufacture of a modern spark plug, dwelling on the difficulties to be met in the way of temperature and high-tension current and finally showed a moving picture film covering spark plug manufacture from beginning to end as practised in the factory at Flint.

At the close of the talk the matter was discussed by representatives of the Champion Spark Plug Co., Toledo, and the Rajah Auto-Supply Co., Bloomfield, N. J., who were in attendance at the meeting.

In tracing the history of the spark plug in this country Mr. Champion mentioned that the first to be made here were those manufactured by Cadillac and Winton, who made them for themselves. The great difficulty in the early days of the spark plug was the breakage of the porcelain. They could not be made to stand up and they also had a pronounced tendency for absorbing oil which soon rendered them useless as it destroyed the insulating properties of the porcelain, allowing the high-tension current to leak through to the shell.

## Insulating Materials Studied

Insulating materials were next taken up. These are porcelain, steatite, mica and glass. The search for the proper ingredients to enter into the manufacture of the porcelain was explained and it was shown how these are brought from different parts of the world. The principal ingredients of the porcelain are kaolin, flint, feldspar and ball clay. These must be all brought together and mixed in the proper proportions and then fired at the right heat in the same way that steel must be given the proper heat treatment. Mr. Champion stated that it was not of advantage to secure the highest possible heat, as it is just as possible to overheat the clay as it is to overheat a steel in heat treating. The proper temperature must be determined from the ingredients which enter into the make-up of the porcelain.

The best porcelain is the one which has the least amount of leakage of electrical current, but there is no porcelain made which has not a point at which it breaks down. It must be remembered that in a cylinder which is firing with too rich a mixture, a virtual carbonizing furnace exists, and this soon has its effect on the porcelain of the plug. All the porcelains used are what are classified as soft porcelain and these will absorb both carbon and water. When carbon is absorbed the porcelain is transformed in its molecular formation and the leakage through the insulator increases.

Speaking of steatite, which was used as the insulating material for Bosch plugs, which are no longer manufactured, Mr. Champion explained that this is a soapstone or talc stone. It has a high dielectric strength, but it is difficult to glaze. The procedure followed in the manufacture of the steatite plugs is to first vitrify and then to use a low-fusing point glaze. It has been found best with this type of insulation not to use a glaze at all, but to rely upon a high polish.

There are two kinds of mica plugs, the wrapped type and the washer. Mr. Champion said that the difficulty with this type is that there is a large percentage of throw-outs due to the fact that the mica is so easily affected. Even the moisture of the hands, he said, will have its effect on the plug and reduce the ability to hold current. The chief difficulty he pointed out is the fact that once the mica absorbs oil it leaks badly. The amount of leakage of a mica plug that is unaffected by dampness or oil is very small.

Glass is bad, according to Mr. Champion, because it is weak mechanically and leaks like the other materials. For this reason it has never been used extensively for spark plugs, although it has been experimented with to a large extent.

Mr. Champion then went into the design of the plug itself. He took up the assembly of the insulator and the central electrode and explained the different methods that are used for cementing the center wire in place, or for clamping it and holding it tight with gaskets, etc. The materials for the central electrodes were also covered, and it was stated that nickel chromium, while good in many respects, is electrolytic, having the tendency of disintegrating under the influence of a heavy current. Some use monel metal for the spark plug wires; this is a copper nickel alloy and is particularly valuable for the relatively small amount of contraction and expansion under changes of temperature. Mr. Champion expressed his liking for the pure nickel.

Some of the phases of design of gaskets, shells and bushings, separable plugs and integral plugs were then taken up by the speaker and the phases of each touched on from both a manufacturing and the users' standpoint.

The discussion on the paper clearly brought out the difficulties under which the manufacturers of spark plugs are working in order to meet the extreme requirements of dielectric and physical strength under the high temperatures of combustion. For instance, in mentioning the fact that the best of insulators become conductors at very high temperature, Engineer Rody of the Champion Spark Plug Co. of Toledo, Ohio, stated that he had made experiments which showed that the temperature reached by the insulator reached 1350 deg. Fahr.

Another point made by Mr. Rody in illustrating the improvements made in domestic porcelains is that in running an engine with spark plugs made 3 years ago it was found that the plugs could not stand up after the engine reached 1800 r.p.m. This was cited as an example to show that the engines of to-day are more oily when running at higher temperatures. This fact was also stated to bear on the observation made by Mr. Champion that the mica plug would be under great difficulty because of the condition that once the mica is filled with oil its insulating qualities are destroyed.

Considerable discussion was also given which brought out the fact that the carbureter is often blamed for troubles which are inherent in the spark plug. One of these is irregular firing on acceleration due to the leakage of the high-tension current through the insulator, thus tending to greatly weaken the spark.

Another point which was accentuated is the remark made by Mr. Champion regarding the fact that a virtual carbonizing furnace exists in some of the cylinders, thus causing a disintegration of the porcelain.

## Plug Mounting Important

Gregory Flynn, sales engineer of the Rajah company pointed out the fact that the manufacturer often did not mount the plugs properly. He said that the engine was first designed and then the question as to where the spark plug could be placed was decided later. He pointed to the lessons derived from racing on this point and showed how in the racing engine the location of the spark plug is given very careful consideration.

Mr. Flynn mentioned the Delage and Peugeot plug mountings as good examples where no trouble is experienced with the plugs. He compared this with the early Deussenberg engines where the plug was mounted through a brass cap which acted as a heat insulator. These engines had continuous plug trouble until the locations were changed. The Cadillac 1913 was mentioned as another example of where the plug had to be changed in order to provide better cooling.



# Officers Extravagant with Cars

**\$3,000 Yearly Upkeep Cost Per Car in French Army—Luxurious Types Bought—Lesson for U. S. Army, No Personal Cars for Officers**

By W. F. Bradley

PARIS, April 19 —Charges of reckless extravagance have been leveled in the French Parliament against the touring-car section of the French army. It has been proved that the General Headquarters Staff ordered twenty-six staff cars, at an average cost of \$6,522, being a total expenditure of \$169,572. These cars comprised thirteen Panhard-Levassors at \$6,328 each, four Renaults at \$6,994 each, four De Dion Boutons at \$6,107 each, and five Delaunay-Bellevilles at \$7,032 each. Each car was fitted up with armchairs and pullman couches, electric lighting, Astra headlights, Houdaille suspension, Grouvelle heating apparatus, and special mahogany cabinet work.

The Parliament evidently considered this unnecessary luxury, for although the House refused to vote the reduction of \$20,000,000 asked for on the estimate, it passed a resolution in favor of \$500,000 reduction. In addition, the general who has been in charge of the automobile service of the French army for a year has been replaced by a colonel who previously was in charge of the automobile services at the front.

## 14,000 Touring Cars Used

All the charges of extravagance are brought against the use of touring cars, and do not touch the truck or tractor service in any way. There are 14,000 touring cars in the service of the French army; about 11,000 of these are with the armies in the field, and the remainder attached to various military services at the rear. It is claimed that the maintenance cost of 1751 touring cars in service at the rear, for a period of nine months, amounted to \$4,455,792. This works out at an average of \$3,000 a year per car for gasoline, oil and grease, tires and spares only.

In attempting to justify this big expenditure, the automobile authorities maintained that there was an error in the estimation of the number of vehicles, and that account should be taken of the 10,000 trucks which were passed through these services from the factories to the various services at the front.

In the debates it was declared that an automobile tractor went every day from Park No. 10 to Nancy in order to bring back a few pieces of ironmongery, while at the same time another truck made the same journey daily in order to bring back a few eatables for the officers' mess. At Chalons, fifteen tractors came in every evening with automobile officers to receive orders which could have been given equally well by telephone. An officer in the automobile service who denounced the waste was brought before a court martial and sentenced to 15 days' imprisonment with hard labor. As the reward of 17 years' army service and eleven campaigns he had been proposed for the Legion of Honor, but this decoration was withdrawn.

A number of cars were requisitioned at the Rochet-Schneider factory, kept in the open air for several months, and then returned to the factory. The factory

refused to accept damaged cars in the place of the new ones they had delivered, and when questions were asked at the Chamber of Deputies it was stated that these cars had been requisitioned as a punishment to the Rochet-Schneider company for having built private cars with military labor. Parliament, however, refused to admit requisitions as a mode of punishment, and the officer responsible for this act was removed.

## Officers Want Personal Cars

The greatest abuse arises from the fact that every army officer of any standing considers it necessary for him to have the use of an automobile, and, wherever possible, to have one particular car and driver always at his disposal. Officers get into the habit of acting as if the cars were their own private property; competition is developed, each officer wanting the best machine and the finest collection of accessories. In some cases a unit has eighty or ninety cars in use, but when an automobile is wanted for general service the sub-officer is unable to supply one, for every machine is the property of some officer.

Before the war, every person holding ministerial office under the government maintained his automobile out of his own funds. When the government removed to Bordeaux, in September, 1914, cars could not be hired in that town, and the army was obliged to place an automobile and a military chauffeur at the disposal of each minister. On returning to Paris this practice continued. As an instance, one famous race driver was for months doing taxi service in Paris at the wheel of a military automobile used by a civilian member of the government. This is only one of hundreds of such incidents.

## Cars Used for Joy Riding

Each headquarters staff maintains at least eighty touring automobiles, and many generals had made it a habit never to undertake a journey without having at least two reserve cars following them. The airplane sections at the front own about 1000 automobiles, there being three or four in each park. These cars are used for nothing but joy riding.

The abuse in the use of touring cars is not confined to the French army. It is a natural growth, which has to be guarded against in all military formations, for every person in authority considers that it is impossible for him to carry out his functions unless he has the use of a car; and when he has obtained the use of a car he endeavors to hold it exclusively for his own services.

The only remedy is to refuse to allow any officer, no matter what his rank, to have a personal car. Automobiles must be attached to a particular unit, and employed for the general benefit of that unit. In addition, every driver must have a pass book, in which all trips are recorded, the persons carried, and the reason for the trip. These pass books exist, but under the old system they were never filled, and when government inspectors

were sent out every obstacle was put in the way of their getting information.

Since the scandals have been revealed and discussed in Parliament much more stringent measures have been applied, both in the army zone and in the interior. In the Paris camp, for instance, military police are now on duty at every city gate, with orders to stop all army cars and ask for justification of the journey they are on. It has not been attempted to lay down hard and fast rules regarding the use of automobiles, for it is estimated that in some cases an automobile journey is justified even between towns having a good railroad connection, but it has been decided to take it out of the power of any individual officer to decide that he shall use a car because he considers the car is his own property, or because he prefers traveling by road rather than by rail. The experience of France in this connection will be valuable in America, for it is certain that with the formation

of an army there will grow up an exaggerated demand for touring cars on the part of officers who could do their work just as well either by train, trolley car, or afoot.

#### Spare Parts Situation Bad

Another abuse which has been brought to light is in connection with spare parts. Owing to 1600 mechanics having been withdrawn from the front to be placed in the factories, 2500 cars have had to be returned to the rear for repairs which were normally carried out in the repair parks at the front. In this connection it was declared that the factories did not like to undertake repair work, nor to make spare parts. In consequence, instead of getting spares from the respective factories, the army now has to make them itself. It was declared that at one aviation school the pupils were dismounting practically new engines in order to get spare parts which the factories refused to supply.

## U. S. A. Export Trade Bigger After War

A CLOSER commercial union with the whole world will be one after effect of America's entrance into the war, according to Pablo Homs, export manager of the Cole Motor Car Co., who recently returned from a European trip and has now departed for the West Indies.

"The attitude of America in entering the war," he said, "has had the effect of destroying barriers with which we would have been confronted in the near future. Now we shall enjoy equality of commercial rights throughout the world and the doors to all the best markets on the globe will be open to all of our manufacturers who care to trade outside their own country.

"A new favorable factor for us is that this war has shaken the old statutes of the world which kept the energies of many countries dormant and their resources unproductive. These energies and resources have been awakened by the hysterical opportunities and sudden necessities of the conflict, and those passive nations in which there was no market for many foreign goods of prime necessity have shown a disposition to buy from us the most luxurious products.

"To some extent, we cannot condemn those whose sympathies and taste were for a French, English, or Italian car, for, while we have always had some remarkably well built automobiles which embodied extraordinarily good features, our manufacturers never paid the same attention to details in the finish of the component units of the vehicle, and even of the very outer appearance, which plays, indeed, such a prominent rôle in deciding a prospective owner to actually buy a car.

"It is true that since 1914 we have sold many cars abroad, that we have made a most unexpected progress in introducing our makes in practically every country on the globe where peacefully bound steamers could touch.

"Do not let us forget, however," said Mr. Homs, "that numerous factors have contributed to our being able to market our motor cars, in large volume, in for-

eign countries. A few weeks ago it appeared as if some of such favorable factors would be eliminated as soon as the war would be ended; now they will remain to help us in conserving the markets we have attained through no virtue or effort of ours and by mere chance.

"Not so very long ago we had reason to fear that our opportunities abroad were to be seriously curtailed and dangerously jeopardized by the measures which the governments of the Allies were taking to discourage, in their fields of influence, the purchase of motor cars made by other than the British, French and Italian manufacturers; to-day the danger of our being antagonized has no doubt disappeared through our having joined our forces to theirs in this world's struggle.

"We have had a taste of the measures taken by the Allies which tended to perfect the economical situation in their respective territories. Prohibitive import duties were declared and enforced; extra heavy taxation imposed on owners; exorbitant prices for gasoline demanded of private owners of cars; preventive measures established against moving cars from the United States ports, and many other restrictions which were most efficient in decreasing the sales of our motor cars to markets that were clamoring for American cars because they could get no others.

"It is astonishing to read of the enormous number of cars that Norway, Sweden, Denmark, and Holland alone have bought in the United States, and such numbers would be still more surprising had it not been for the restrictions imposed on the exportation of our cars, and for the fact that the acquisition of rubber tires in those countries was severely regulated and restricted.

"At intervals in August, September, and October of 1914 I happened to be in Petrograd, and my duties on behalf of a prominent American corporation placed me in constant touch with the officers of the Automobile Brigade. Such officers were not to be found in their army quarters, but in a vast and large

public square in the capital of Russia, named the Morsovo Pole, or Field of Mars, in which the great autocratic military parades once used to be held with medieval splendor, but which in those months were covered with hundreds of automobiles of every description, made in Germany, France, Italy and England.

"The officers of the automobile parade were inspecting and appraising the motor cars which the army required and which cars were sent to the Field of Mars by the private owners who had been invited to show what motor vehicles they possessed.

"Upon glancing over that tremendous number of motor vehicles, I could not avoid reflecting upon the infinitesimal specimens of cars made in the United States which were in that vast square. A few Fords, a Buick, here and there a solitary Cole, an antiquated White, a dilapidated Packard, once the pride of its vendor; yonder a Studebaker or an Overland hidden among a large fleet of cars made somewhere in Europe, were the full extent of the exhibition of the automobiles produced in our American factories. There was the best proof that our selling methods had not reached that wonderful country where the erroneous idea prevailed that the American motor vehicle was an inferior product, irrespective of whatever its price might be, compared to the product from the works of those European countries which controlled those markets.

"An American motor car was looked upon with skepticism; it was not considered to be worth comparing to any Pegeaud, Mercedes, Rolls Royce, or Itala, no matter what its cost might be. Whoever required a good car bought one made in Europe and would not have given much consideration to purchasing any of the excellent cars constructed in the United States. For some reason the car 'made in the United States' was not in favor then. It did not command the confidence of those buyers who had such an equivocal impression of the merits and performance of the American car."



# MANUFACTURERS' MERCHANDISING

Twelfth Article of  
The Automobile's  
New Department

Manufacturer  
to Distributor,  
Dealer, Buyer

## Paige School Promotes Efficiency of Salesmen

Educational Department Teaches the Dealer and His Salesmen How to Sell Cars

By Allen Sinsheimer

"IF Hughie Jennings takes a minor league ball player down South for two months and by special training and education converts him into major league quality he makes his team just so much stronger. If we take our dealers and their salesmen and by special training and education convert them into high-class automobile sales artists, we make our sales organizations just so much stronger. It's the same rule whether applied to baseball or automobiles. And it's the principle which governs the plans of the sales promotion and efficiency department in our company."

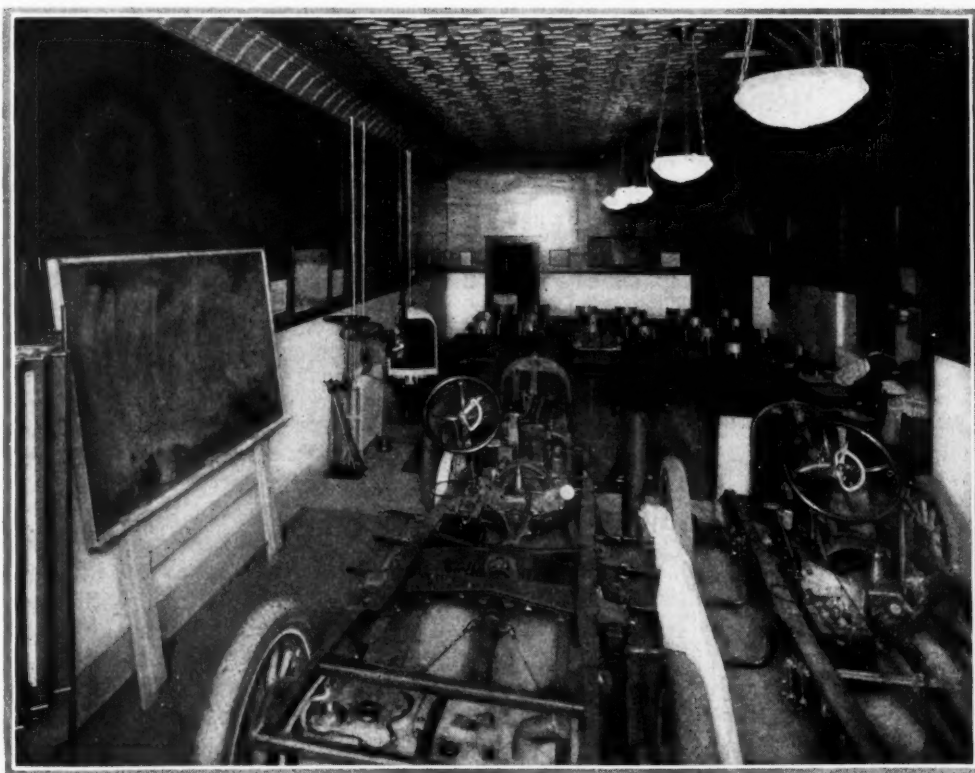
This is how Charles S. Pike, manager of the Paige-Detroit Motor Car Co. sales promotion and efficiency department, explains his work.

The department is almost wholly educational. It attempts by the employment of numerous schemes and devices to educate the distributor, the dealer, the dealer's salesmen and the service men how to sell Paige cars, how to keep them in excellent condition, how the cars are manufactured and all other information that tends to increase the efficiency of the entire Paige organization.

During the Winter months of December, January, February and March a school was conducted at the factory where dealers and their salesmen could take a

course on the manufacturing and selling of Paige products.

The company's district managers were first given the course, and were followed by weekly classes ranging in number from fifteen to forty pupils who came from their various cities partly at the expense of the company, partly on their own expense, and in some instances with expenses paid by the dealers. The company paid the hotel bills for all. The men taking the course paid their own railroad and board bills. But those pupils who attained certain averages in their examina-



Paige schoolroom, showing the chassis and other parts and charts used



General view of schoolroom used by Paige-Detroit Motor Car Co.

tions were refunded the railroad fares and board by their dealer employers.

The schoolrooms were equipped with chassis, engines and all the parts of the cars, blackboards, school seats, benches and tables.

Courses comprised lectures given by representatives of the companies making the various parts of the Paige cars, addresses by Paige employees on the subjects of carburetion, ignition, assembly, operation and so forth, and important emphasis was laid upon the principles of salesmanship.

Each night as the pupils retired to their hotels they found a sheet containing fifty questions relative to the day's lectures, which they were required to fill out and return early the following morning. The papers were checked, graded and marked and the records of each pupil were posted on the blackboard. These were also forwarded to the general sales manager of the Paige company and to the dealer employer of the pupils. The scheme proved successful as a stimulant, and each day found the students eagerly watching the blackboard to discover how high a grade they had attained. Prize buttons were given to the holders of the highest marks, and other special distinctions, such as allowing the highest student to become chairman of the meeting, were granted.

#### A Diploma Given

Every pupil who attained a certain percentage for his week of study was given a diploma stating that he had graduated from the Paige school and bearing a photograph of the class of which he was a member.

The plan has been found successful in every instance. It provided the pupils with new knowledge of the Paige car, of salesmanship, and of the Paige company, and instilled fresh enthusiasm into the dealers' organizations.

With the opening of the Spring selling season the

attendance of the school fell to such an extent that it was temporarily discontinued, and the educational campaign is now carried on by mail.

The department has published a loose-leaf book called the Paige Primer, which is sent to every dealer, distributor and salesman, and is charged to him at a \$5 rate, which is cancelled if the books are returned at the expiration of the dealer's agreement.

#### What the Book Contains

The book contains information on the following:

A history of the Paige-Detroit Motor Car Co.

The principles of salesmanship.

Miscellaneous closing methods.

How to make a personal sales manual.

Various classes of buyers.

Car demonstration.

A typical salesroom presentation of a Paige car.

This is a dialogue between salesmen and prospect.

Typical questions of prospects, with answers for salesmen.

Illustrations of the Paige factory and of the various parts of the Paige cars.

Description of all parts, of testing machines, and of methods for caring for the parts.

Specifications of cars.

Testimonial letters from car owners.

Salesmen are instructed to read the book thoroughly and to always have it on hand for reference. Questions printed with space allowed for answers are mailed frequently to the salesmen and the replies are checked and graded in the same manner as at the factory school. The questions relate to subjects discussed in the primer and the answers serve as an index to the salesmen who read the book and understand and use it.

Among the questions asked are:

Give four definitions of salesmanship.



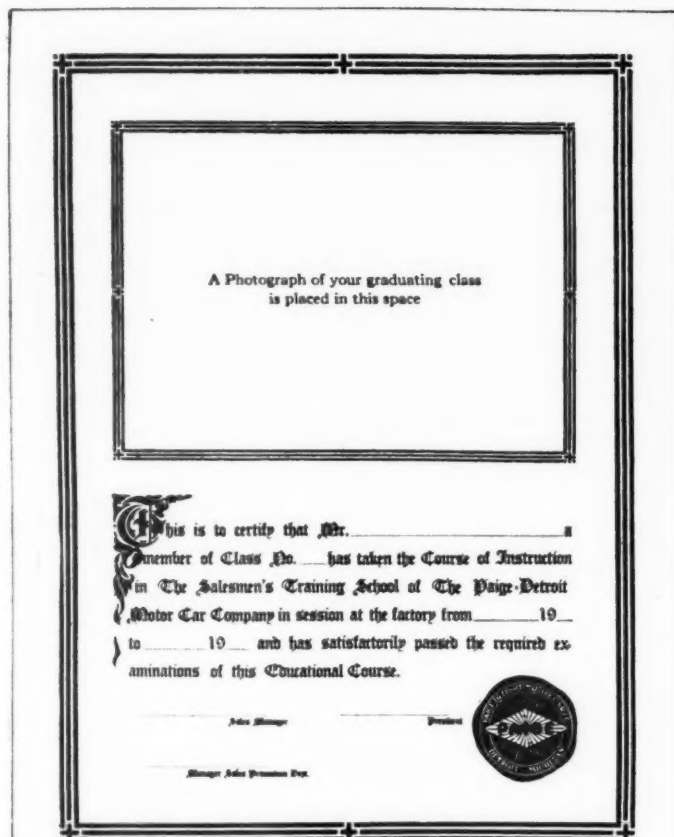
Outline an analysis of what in your opinion constitutes a preferable cooling system for an automobile engine.

Define the mental sales as given in the Primer.

Give eight advantages of the Paige flexible floating drive.

The replies, after being checked, are returned to the pupil with a sheet containing the questions with correct answers printed on it, and the dealer is notified of the standing of his pupil-salesman.

In addition to these plans, the department operates



### The Diploma of the Paige Educational and Efficiency Course

should be of value to any Paige dealer and salesman. Its possession testifies to a week of thorough study of the Paige product and sales methods, and implies that the owner has a well-grounded knowledge of the Paige motor car and all its selling points.

If you wish to make yourself more efficient in selling Paige cars and increase your business as a dealer or salesman, we urge you to enroll your name as a member of one of the future classes. Don't delay in accepting this great opportunity to better yourself, your business and make more money during 1917.

Fill out the attached card of enrollment and mail to the Sales Promotion Department immediately. Next class that is open is the one beginning January 29th, 1917. Only twenty can enroll for any one class.

Sales Promotion Department.

Paige-Detroit Motor Car Co.  
Sales Promotion Department  
Detroit, Michigan

Date \_\_\_\_\_

Please enroll my name as a member of your Educational Course for the week

of \_\_\_\_\_ or the week of \_\_\_\_\_

Signed \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

(State whether dealer or salesman)

Diploma of the Paige educational and efficiency course

a field school through its district managers, who organize classes in the various cities they visit and give the same instructions as they received at the factory school. Some of the district managers have been found capable of making and marking examinations and of conducting the classes as efficiently as does the parent school.

In some instances President Harry M. Jewett and Mr. Pike, in company with Henry Krohn, sales manager, have visited the larger dealers and held classes which were attended by representatives of the makers of parts of the Paige cars, and in these cases the instruction was as complete as that given at the factory. These larger field schools have been inaugurated in such cities as Philadelphia, where seventy-five pupils from the dealer organizations in nearby towns were in attendance.

### House Organ Published

The department also publishes an organ called Paige-Power, which contains information on sales and business conditions and circulates only through the Paige distributor and dealer organization. In it methods of handling used cars are discussed and plans for their sale are outlined. Service as given in some of the Paige dealer plants is described for the benefit of other Paige dealers, and numerous other articles take up subjects important to successful merchandising and sales.

Printed sales letters are issued weekly on single sheets and discuss the ideas of the most successful salesmen and the officials of the Paige company, and aim to instill enthusiasm into the dealers.

### Shortening the Registration Code

TWO methods of shortening the registration numbers for automobiles have been worked out by Arthur C. J. Roy, Providence, R. I., who has been studying this subject from time to time since 1911. The use of the alphabet instead of State abbreviations and instead of series numbers is the basis of the suggested code.

For the names of the States Mr. Roy would use letters. Since there are but twenty-six letters in the alphabet it would be necessary to divide the States into two groups. The Mississippi River would serve for this purpose, since there are twenty-six States to the east of it. The District of Columbia demanding a twenty-seventh symbol could be represented by a monogram of U. S. The eastern group could use white letters on a black background, and the western group employ black letters on a white background.

The letter to represent each State under the Roy system would be fixed on the basis of population, A for New York, B for Pennsylvania, and so on. The year of the license could be indicated by the last two numbers of the year on the State letter.

### Program Requires Federal Sanction

This program for shortening the symbols for each State could not be carried out without some Federal agreement. The second part of the Roy code is therefore the one which can be adopted by an individual Legislature. This part deals with shortening the numbering system of automobile licenses within any given State. Here letters with one figure are used up to ZZZZ9, which would afford over 600,000 markers without going beyond a five symbol identification sign. Under this system by the time ZZZZ were reached over 450,000 markers would have been provided. If both parts of the Roy system were adopted a New York marker would read A-ZZZZ, or some shorter symbol, until the 450,000 registration mark had been passed. On one leg of the State letter A would appear the year number.

# Manifold Vaporizes Unatomized Fuel

Heat from Exhaust on Spot in Brush Intake Manifold Is Applied Directly to Heavy Elements

**A**N intake manifold which incorporates a hot spot at the proper point to break up the unvaporized fuel has been designed by the Brush Engineering Assn., Detroit. This manifold is used on the new Monroe car and there are other manufacturers who are at present experimenting with it. In view of the large percentage of non-volatile elements in present fuel, it offers an interesting method of solution for a very difficult and complex problem.

The usual atomizing method in combination with a reasonable amount of heat at the intake air has brought results which are fairly satisfactory in warm weather, but which give difficulties in cold weather. It is quite noticeable that if the weather grows cooler there is a failure to consume all the fuel. This can be noticed by the falling off in mileage per gallon, difficulties in acceleration, uneven impulses in the different cylinders due to uneven distribution of the fuel, and the rapid deterioration of the lubricating oil in the base of the engine, due to unconsumed non-volatile fuel elements passing the pistons and accumulating in the crankcase of the engine.

During the past winter many careful car owners changed the oil after every 2 weeks' running. The manner in which the Brush system is intended to meet this is to apply the heat directly to the non-vaporized fuel after it has been mixed in the carburetor and entered the manifold. The manifold is a tubular passage of rather large diameter extending the length of the engine, from which the inlet valves open directly into the cylinders in a downward direction. At the center of this distribution passage is the opening and flange for the

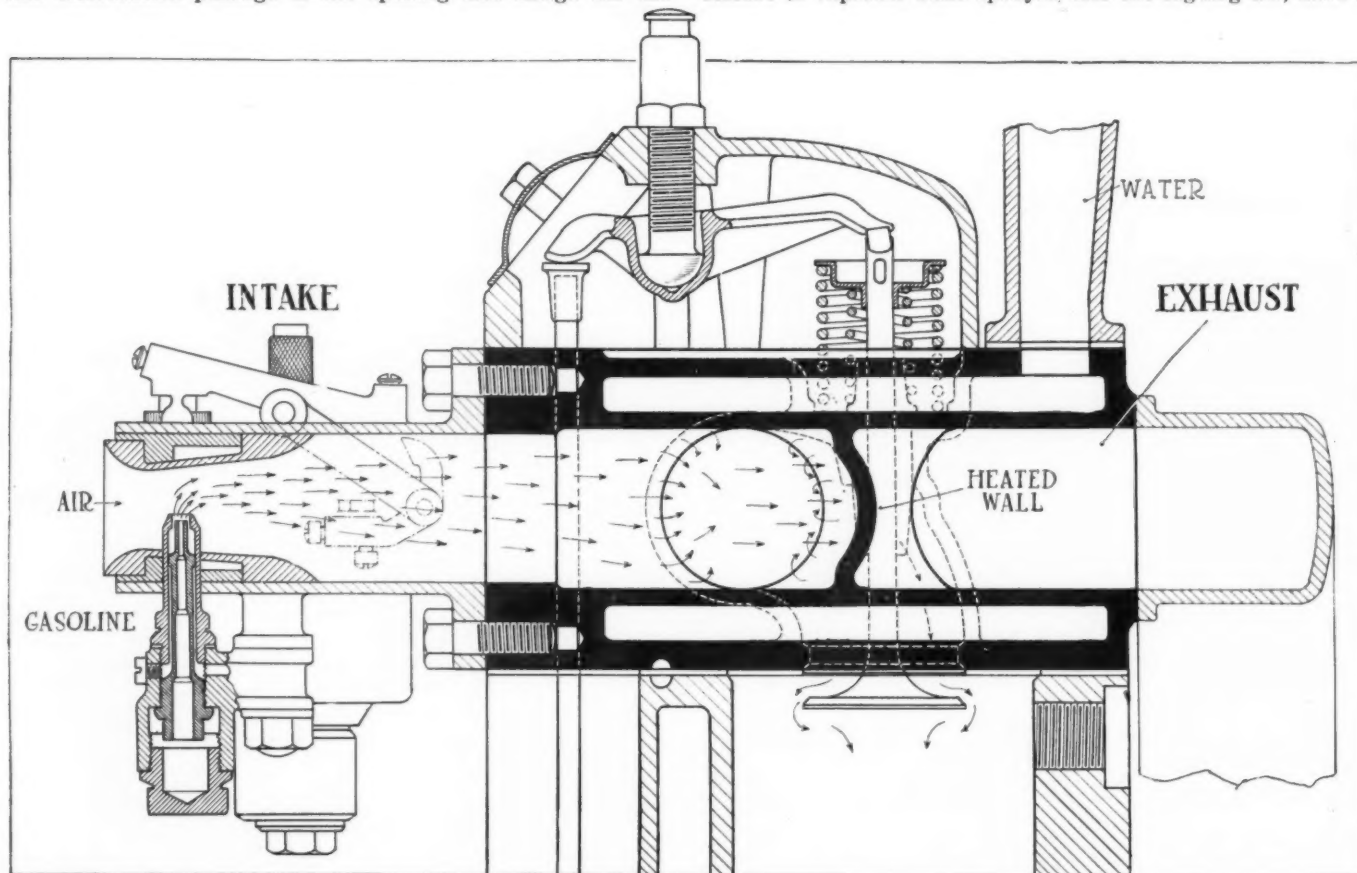
attachment of the carburetor. It is preferable that the instrument should be a horizontal, straight tube type. On the opposite side of the manifold from the carburetor and immediately at the end of the tube leading from the carburetor into the manifold is a spot of the tube surface which is heated by the exhaust from the two central cylinders. With the exception of this spot the entire manifold tube is water-jacketed, and the size of this hot spot is therefore definitely controlled by the water jacketing which surrounds it.

In operation, what takes place is the air, which is introduced through the carburetor, picks up in the usual manner a given amount of fuel. As they enter the manifold tube from the carburetor the air and the vaporized gas turn directly at right angles either to the left or to the right along the manifold tube. All the particles of unvaporized fuel coming through the entrance tube in the form of globules are carried by the inertia due to their own weight and velocity against the hot spot at the end of the entering tube. The hot spot is heated to a sufficiently high temperature to vaporize the non-volatile globules which strike it, changing them into gas which mingles at once with the rest of the ingoing charge.

## Do Not Have Time to Condense

Owing to the fact that the time between the vaporization of these heavy elements and their entrance into the cylinder is quite short, they do not have time to recondense, and hence the mixture enters the cylinders as gas.

The less volatile portions of modern fuels, owing to their failure to vaporize when sprayed into the ingoing air, have a



Section through Brush manifold, showing how gasified fuel enters intake gallery while liquid particles strike heated wall, where they are quickly evaporated



strong tendency to travel in straight lines instead of following the path of the air-flow whenever there is a change in direction of that flow. In ordinary manifolds this tendency results in uneven distribution of the fuel between cylinders. In addition this characteristic causes the unvaporized fuel to spread itself over the walls of the manifold passage after the first bend, thus producing a very noticeable lag in the fuel flow, making, as has been pointed out, quick changes in engine speed or power output increasingly difficult as the percentage of non-volatile elements in engine fuels increases from year to year.

This condition has been partially overcome in ordinary practice by pre-heating the air, and by the use of smaller intake manifolds which keep the air velocity high, so as to sweep the non-volatile fuel along the manifold walls more nearly in proportion to the rate of air flow.

This reduction in manifold diameter naturally, like the pre-heating of the air, tends to reduce the volumetric efficiency of the engine.

In the Brush type of manifolding this undesirable characteristic of unvaporized fuel, as is apparent from the foregoing outline of operation, is used to automatically correct all of these objectionable results; that is, the tendency toward straight line flow of unvaporized fuel particles is used to bring these particles in contact with the limited portion of the intake passage which is heated sufficiently to cause practically instantaneous vaporization.

The claim is made that this method permits the satisfactory handling of fuels having a wide variation in the amount of relatively non-volatile elements.

Obviously only unvaporized particles of fuel can be thrown against the heated surface and contact between the unvaporized fuel and the heated surface can only exist long enough to produce vaporization.

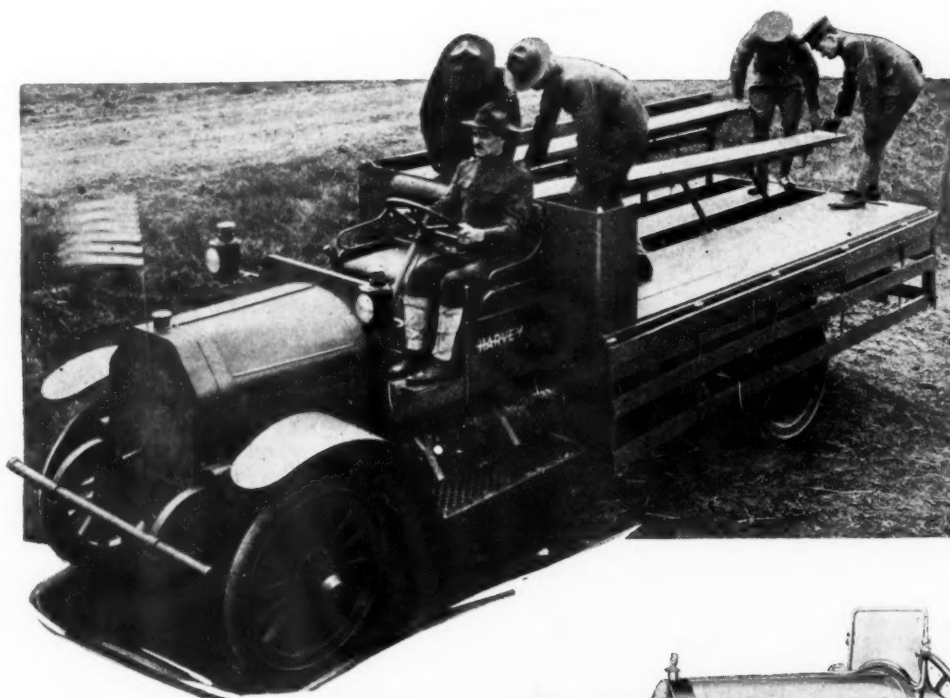
The location of the hot-spot is such that it can have very

little, if any, effect on the temperature of the ingoing air. In actual operation there is always a layer of vaporized fuel between the hot surface of the manifold and the current of inflowing air.

#### Easy Starting

It is claimed that this manifold arrangement permits of easier starting at low temperatures than with the ordinary type. The reason given for this is that there is a natural downflow from the carburetor through the intake valves into the cylinder. This is illustrated in the accompanying drawing. The effect of this is that a choked carburetor gives the same effect as a primed engine, because the actual fuel practically flows into the cylinders. The suction of the engine in cranking is sufficient to draw this fuel into the intake gallery, or manifold, and from here it flows by gravity as well as by suction into the cylinders. Because the hot spot is in direct communication with the exhaust flame it is quickly heated to a sufficient degree to assist in the vaporization of the fuel, so that the engine will reach its running temperature in a comparatively short time. Another claim made is that when an engine has reached a satisfactory operating temperature, it is not affected to any great extent by the temperature of the air surrounding it.

To sum up the entire effect, the fuel is vaporized without raising the temperature of the entire ingoing charge beyond that minimum necessary to secure vaporization. This permits of a relatively cold charge being introduced, and the volumetric efficiency of the engine is therefore not reduced by pre-expansion of the indrawn air. One of the main contentions is that the fuel being fully vaporized, a much larger proportion than usual is consumed in power development, thus giving a higher thermal efficiency with a maximum flexibility without the possibility of deteriorating the lubricating oil in the base.

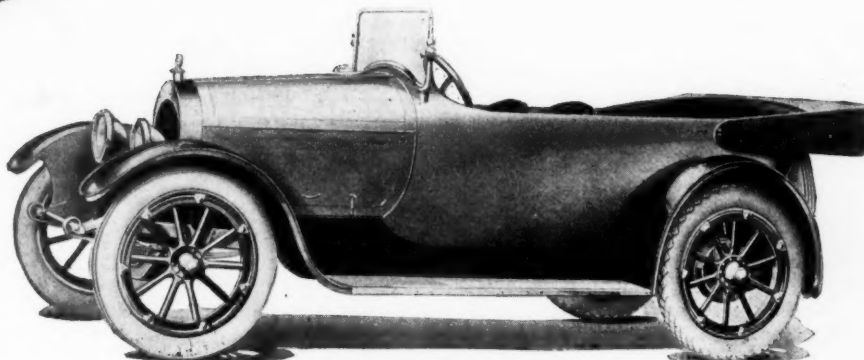


#### Harvey Transport Body

THE Harvey Motor Truck Co., Harvey, Ill., has designed the combination army transport truck illustrated at the left for transporting troops and also freight. It is of 2½-ton capacity and is equipped with a body that is only 6 ft. wide by 12 ft. long, and carries conveniently a load of thirty-two to thirty-eight men. There are three rows of seats placed longitudinally and the men sit astride of them as on a horse. A feature of the seating arrangement is that these seats can be dropped in 3 min., thereby giving a flat platform or a stake body, which can be used for transporting freight or other supplies.

#### Nelson as Touring Car

THE Nelson car, made by E. A. Nelson, mechanical engineer, Detroit, is now made in touring form as well as in sedan. When originally described in THE AUTOMOBILE for Dec. 28, 1916, it was only made in sedan form. The illustration shows the touring body, which is notable because the cowl is almost entirely omitted. There is only one door in the car and this is on the curb side.



# A. S. M. E. Discusses Aviation and Truck Engines

Fire Engines Also Considered — General Agreement with Airplane Engine Principles Defined by Lucke

By J. E. Schipper

CINCINNATI, OHIO, May 24—A sub-session of the American Society of Mechanical Engineers, devoted to gas power subjects, was held here to-day in connection with the closing period of the engineering convention. Four papers were scheduled for reading as discussion and the session was attended by about forty members of the society.

Owing to the fact that the gas power session was interrupted by a call from the president of the main body, to discuss some resolutions in connection with recommendations to Congress on matters pertaining to the mechanical engineers during the war, the discussions had to be cut very short and the papers themselves could not be read except in abstract. In spite of the handicap, however, there was considerable interest in the session and many pertinent points were brought up.

The papers which were scheduled for the gas power session were as follows:

"The Problem of Airplane Engine Design," Charles E. Lucke, Columbia University.

"The Design of Motor Truck Engines for Long Life," John Younger, truck engineer, Pierce-Arrow Motor Co.

"Test of a Motor Fire Engine," Horace Judd.

"The Influence of Port Area to the Power of Gas Engines and Its Influences on Regulation," J. R. DuPriest.

Only one of the authors of the papers was present at the meeting, this being Horace Judd, who had the fire engine paper. The other papers were either abstracted by the secretary or the chairman. This no doubt had considerable influence in shortening the discussions, which were hurried to a regrettable extent.

## Problem of Airplane Engine Design

This paper by Charles E. Lucke was reproduced in THE AUTOMOBILE for last week.

There were some written discussions submitted on this paper, notably by C. M. Garland, R. C. Carpenter and H. L. Horning of the Society of Automotive Engineers. Mr. Garland pointed out two lines along which improvement could be made, these being in the design of the exhaust valve and ports and in the arrangements for carrying heat away from the piston. He said of the two problems that of thermal conductivity to get the heat away from the pistons is the more difficult. He mentioned pre-ignition as having occurred in an engine which allowed the piston to run at a low cherry heat. He also told of some experiments on this line which showed that with water taken to the piston so as to reduce its temperature it was possible to increase the compression pressure from 70 lb. to 250 lb. absolute without getting pre-ignition. It is, of course, impractical in the light of present development to attempt to watercool the pistons, but the idea of the test was to show the relative importance of good thermal conductivity as regards the piston.

R. C. Carpenter said that the observations of the author are exactly in line with those of Neil McCoull, whose views were presented in a paper before the Society of Automotive Engineers, Mr. Carpenter also pointed out the extreme necessity for reliability in the air. He said that in a motor boat or car, if the engine stopped it only meant an inconvenience, while in the air it may be disastrous. He also said that steel is better than cast iron for cylinder use, and that for light weight and conductivity the aluminum alloys are giving satis-

faction. He spoke of the rapid development of design generally during the last 2 years and predicted a rapid continuance of this work.

## Essentials of Perfect Combustion

H. L. Horning, in commenting favorably on the paper, stated that the demand for high output from the power plant makes necessary the quantitative analysis of the power plant as given in Prof. Lucke's paper. Referring to the paragraphs in the paper which deal with compression, mixture quality, dryness of mixture, homogeneity of mixture and rate of flame propagation, Mr. Horning said that these are the fundamental points where a fuel is used whose endpoints are 400 deg. Fahr. and above. Mr. Horning also commented upon the method used by Prof. Lucke in quantitatively analyzing the unit metal weight of the multi-cylinder engine and said that these paragraphs should be read and studied by all engineers who are dealing with this class of work.

Mr. Horning said that the examples cited by Professor Lucke on the differences in expansion rates of metals should open the eyes to the real reason why valves do not seat correctly. He went on to say that the study of the engine from the thermal stress standpoint is very important. In regard to valve cooling particularly, Mr. Horning said that the flow of heat is from the center of the valve towards the seat. Speaking of Professor Lucke's paragraphs on design from a thermal flow standpoint as well as from the standpoint of mechanical stress, Mr. Horning referred to them as a masterpiece on thermal stress. He said that it should be remembered that internal combustion engines are primarily heat engines and should be designed accordingly to thermal requirements.

H. E. Morton spoke in favor of the detachable head, which, he said, should have been mentioned in the paper. The internal sleeve engine with the solid head he stated is apt to give trouble, but with the detachable head a very satisfactory job can be made. He also said that with the detachable head there are manufacturing advantages.

E. W. Roberts spoke in favor of the two-cycle engine, which he claimed to be as good as the four-cycle without its valve complications. He said that where the three or four types of aeronautical two-cycle engines had fallen down it was because their intakes were inadequate. He mentioned the engines found in one of the Zeppelins brought down by the British in which he said there were five valves to a cylinder, two inlets and three exhausts.

## Airplane and Automobile Work Differs

H. M. Crane of the Wright Martin Co. pointed out that a fundamental difference between airplane engine design and automobile work is in the necessity for having the weight-horsepower ratio at a minimum. He said that the limit of power for airplane engines has by no means been reached, and that we are quite sure to have 500 hp. and over before long. It is necessary for the engine to have full load capacity with 100 per cent reliability. The matter of noise is not important and flexibility is not required because practically all the work is done with wide open throttle.

The matter of vibration must be taken care of, and one of the means of doing this is by the use of light materials. The matter of gas economy is essential and it is necessary to use



high compressions. Another necessity is the highest quality of ignition, with the spark plugs capable of withstanding the running temperatures to which they are subjected. Mr. Crane spoke of the success of the I-head engine, but also stated that the L-head would be continued.

#### Truck Engines and Long Life

Motor truck engines operate under such widely varying conditions that the problem of securing long life is not a simple one. This was brought out by John Younger in his paper on "The Design of Motor Truck Engines for Long Life." Three factors were cited by Mr. Younger as determining the life of the engine: design, manufacturing excellence and operating conditions. He then proceeded to analyze these factors in order.

Under the head of design he summarized present practice, giving information on recommended materials, dimensions of parts and factors of safety for the various engine parts.

In studying manufacturing excellence it was brought out that the best workmanship is essential to long life of the engine. Workmanship tolerances and running tests were some of the subjects touched on in this connection.

In connection with operating conditions Mr. Younger pointed out that special attention should be paid to lubrication, cleaning, inspection and regulation. He gave recommendations on how to maintain motor truck engines in first-class condition.

F. A. Whitten, chief engineer of the General Motors Truck Co., handed in a written discussion on the paper in which he dealt at length with the difficulty of controlling the proper operation of the truck by the owner. He spoke of the driver element and told how the governors cannot be relied upon to

regulate the truck because they are put out of commission by the drivers. It means a tremendous campaign of education, he said, to teach the new truck owners particularly. He said that those who have owned and operated trucks before will, as a rule, be very much more careful than the new owners because they have learned their lesson through the failure of the truck to last as long as it would have had it been handled correctly.

#### Driver Should Not Have Carbureter Control

Mr. Whitten also said that the driver should not have control of the carbureter because of his tendency to run at a rich mixture in cold weather. That is, the truck would be made to pull its load before it is warmed up by being run on a very rich mixture with the result that some of the non-volatile constituents will get into the crankcase and spoil the oil.

H. E. Morton in a written communication dealt with the three lubricating systems now in use—the pressure, splash and splash pressure. He said that the purely splash system cannot be depended upon to do the work, and that it is necessary to use one of the other two. He mentioned the tendency for loose carbon to get into the oil and thus damage its qualities in spite of the most careful filtering processes.

E. W. Roberts said that the limits of tolerance mentioned in the paper, namely 0.002 in., are too great. It is not so much that they are too great in practice, but in having such wide limits in manufacture it is apt to breed carelessness among the workmen. He favors a maximum tolerance of 0.001 in. Another point he brought up is in connection with the bearing grooves, which he said should be H-shaped and not X-shaped, because in the latter instance the parts to the left and right of the center of the X ran dry.

## South Fertile Field for Electric

IN the South lies one of the greatest opportunities for the electric car, according to E. P. Chalfant, manager of the eastern division for the Anderson Electric Car Co., who has just completed a long business tour through Dixie.

Two principal reasons stand forth, he states—the electric is suited to the South and the South likes the electric.

"In the South," said Chalfant, "most cities have their streets well paved and the country roads are sandy or slippery clay, so that little touring is done outside a radius of 25 miles from the cities. Cities which fit this description are Richmond, Norfolk, Winston-Salem, Charlotte, Columbia, Charleston, Savannah, Atlanta, Macon, Jacksonville, Tampa, Mobile, Birmingham, Montgomery, New Orleans, Meridian, Nashville, Chattanooga, Knoxville and Memphis.

"The population inside the city limits of these cities is 1,594,583. If cars were sold at the rate of only one to 500 people

it would mean the sale of 3189 cars. And where the cars sell repeat orders come easily in this section.

"The country is wealthy. The people have money and the cities are prosperous. The wealth comes from cotton, tobacco, fruits, lumber and naval stores, and is increasing. The people like the electric type of car. They love creature comforts and convenience, and are a deliberately moving type which is not keen for strenuous touring or speed. They like good appearance and the atmosphere of affluence, and appreciate luxury and good things.

#### Demand for Inclosed Cars

"It may be surprising to many to know that the nearer the equator you go the more inclosed cars are used. They are hot-climate cars as well as winter cars. A heavy roof, heavier than a canvas top, is necessary to keep out the intense heat of the sun. And along the coast a sea

breeze comes up at 4 o'clock and it is chilly driving during the evening. Also, heavy and chilling fogs often come down at night, and an inclosed car is almost necessary for real comfort.

"For 15 years I myself labored under the delusion that the coolest driving is with the top down, but I have learned differently. It may be more pleasant but it is not coolest. All this makes the electric type of body highly desirable. In Havana many electrics are in use.

"There will have to be more dealers and better electric facilities before sales can go very far. In most of the cities I visited there are generally not more than three dealers in electrics, and often only one. We have placed an agency in Havana. In all of these cities conditions are ripe for the invasion of the electric with the exception of central station arrangements. We must make better arrangements with the central stations and then sales will follow easily if pushed."



Plant of the American Motors Corp., Plainfield, N. J., maker of the American Six. Dimensions are 60 by 400 and output this year will be 3000

# 600,000,000 Gallons of Synthetic Gasoline Available for 1917

Automobile Fuel Problem Temporarily Solved—Casing-Head Gasoline of Considerable Importance—Cracking Processes Classified

By Walter F. Rittman

*This paper was read by the author at the Kansas City meeting of the American Chemical Society, April, 1917*

THE market value of synthetic gasoline produced by cracking in the United States during 1917 will be sufficient to supply the Navy with ten superdreadnaughts. In other words, one-fifth of the 3,000,000,000 gal. to be produced will be made by cracking.

By July 1 of the present year there will be in operation in the United States 4,000,000 automobiles. Financial men, in considering the investment value of motor stocks, have for several years been dwelling upon the saturation point, but, despite this consideration, the demand for machines still keeps well ahead of the 40 per cent average yearly increase of past years. When the saturation point will be reached nobody knows. Responsible and successful automobile men maintain that the present increase in rate of production will keep up for years, and that after the present high prices of materials the price of cars can be so reduced that every family having an income over \$1,000 may own a car. On this basis, the United States will have in the neighborhood of 10,000,000 automobiles, two and one-half times the present number. Assuming an annual life of five years per machine, 10,000,000 cars means an annual replacement number equal to 2,000,000; i.e., our present rate of production. When one questions the correctness of the opinion of the automobile man who suggests the above figures, the answer is made that every prediction which the automobile man has heretofore made has been too conservative. An important consideration is the greatly increasing number of motor trucks necessary to replace the shortage in horses. As to the influence on this industry of the United States' entrance into the European war time will tell.

Only the steel, lumber and clothing industries exceed the automobile business in importance to-day. Detroit, the center of this new industry, has risen as a manufacturing center from sixteenth place in 1900 to sixth place in 1914. In the United States over 500 factories are to-day engaged in making different types of automobiles, and new companies of varying stability are announced each week. As a side light, it is interesting to observe the approximate annual upkeep involved in America's automobile bill, which is as follows: Gasoline, \$500,000,000; tires, \$500,000,000; accessories, \$300,000,000; garage hire, \$150,000,000; repairs, \$150,000,000.

The number of automobiles in use in this country on Jan. 1, over the period of the past fifteen years, is as follows:

Year	Number of Cars	Year	Number of Cars
1905 .....	85,000	1914 .....	1,253,875
1910 .....	400,000	1915 .....	1,754,570
1911 .....	600,000	1916 .....	2,225,000
1912 .....	677,000	1917 .....	3,250,000
1913 .....	1,010,483	1918 .....	4,750,000

However, gasoline requirements are not limited to the above automobiles, but in addition tremendous quanti-

ties are exported, are used in motor boats, motorcycles, farm engines, chemical manufacture, cleaning establishments, etc., etc. The requirements per machine per annum vary with different users, some using on an average of less than a gallon a day, whereas the public vehicle often uses as high as 10 gal. a day. Statistics would indicate that the average consumption per car per annum approaches 500 gal.

Of the various problems confronting the automobile industry the motor-fuel problem of the future has loomed up as the most important, but it would seem that this problem will, temporarily at least, be solved. Much discussion and attention is paid to the use of gasoline substitutes, such as alcohol, benzol, gasoline from natural gas, electricity, etc. All of these materials are very valuable sources of power, and the extent of their use is entirely a question of quantity produced and price. Alcohol is commercial when gasoline exceeds 35 cents per gallon. This price, however, is based on ante-war prices, as every one realizes that the present price of alcohol makes it prohibitive. Benzol, when mixed with gasoline, makes a superior type of motor fuel, and here again it is entirely a question of the supply available. The figures of the best informed people in this field indicate a supply of benzol and light oils available equal to 100,000,000 gal., which, it is observed, will fulfill less than 10 per cent of our motor-fuel requirements, even though none of the benzol and similar materials were used for explosives and other chemical purposes.

Casing-head gasoline (gasoline from natural gas) is an item of considerable importance because it is so volatile and has such wide explosive limits that it can be blended with naphthas and thereby make available for motor use materials which were not available. The production of this material has been as follows, but this production, it may be remarked, will hardly supply more than one-tenth of our fuel requirements:

Gallons		Gallons	
1911 .....	7,425,839	1915 .....	65,364,665
1912 .....	12,081,179	1916 .....	125,000,000
1913 .....	24,060,817	1917 .....	200,000,000
1914 .....	42,652,632		

Much is heard of the kerosene carbureter, and the patent office holds thousands of carbureter patents. Professor Lucke of Columbia University rightly believes that in the development of a commercial kerosene carbureter it will not be a new invention, but a matter of design utilizing parts from various patents or designs already developed that will solve the problem. Practically no consideration has been paid to what is perhaps the most important factor militating against the use of kerosene, i.e., the question of explosive limits. This will be discussed later. The carbureters already invented surely embody all possible principles, so it would seem that from this time forward the problem is one of a design wherein ideas from different carbureters are



brought together in a new form. A partial way out of the difficulty may be by reversion to the steam type of automobile, in which heavier oil is used to generate the steam.

The increase in the crude-oil production of the United States during a period corresponding to the automobile figures previously given is shown as follows in barrels of 42 gal.:

1905 .....	134,717,580	1913 .....	248,446,230
1910 .....	209,557,248	1914 .....	265,762,535
1911 .....	220,449,391	1915 .....	281,104,104
1912 .....	222,935,044	1916 .....	292,300,000

The production of gasoline, also in barrels of 42 gal., has been:

1904 .....	6,920,000	1915 .....	41,600,000
1909 .....	12,900,000	1916 .....	54,760,000
1914 .....	34,915,000	1917 .....	*70,000,000

\*Estimated.

From these figures it will be observed that during the period from 1910 to 1917, when the number of automobiles increased eightfold, crude-oil production grew but a little over one-third, and gasoline production increased four times, an order of magnitude comparable with the growth in production of automobiles. This increased production of gasoline from a relatively constant quantity of crude oil is obviously the result: First, of taking a larger portion of motor fuel from the crude oil and calling it gasoline; and second, of producing gasoline from heavier oils by cracking.

The question naturally arises as to how much further into crude oil the petroleum man can cut in order to increase the supply of motor fuel. We have all observed the Baume gravity of gasoline decrease from the seventies to the fifties, which means an increase in the specific gravity from 0.700 to 0.778. But practical motor men to-day believe that with the present automobile carbureter and engine gasoline containing heavier portions of the crude oil below 50 deg. Baume does not work efficiently.

Scientific explanation of the fact can be found in a consideration of the explosive limits of various hydrocarbons. For every mixture of hydrocarbons and air, as is produced in the carbureter, there is a proportion below which the mixture contains too small a percentage of hydrocarbons to explode. There is also an upper limit above which the mixture contains too large a percentage of hydrocarbons to explode. Between these two limits is the desired range in which the proper explosive mixture is formed. For instance, a mixture of natural gas and air containing below 5 per cent of gas will not explode; also a mixture containing more than 11.5 per cent of gas will not explode. Hence the explosive limits for mixtures of natural gas and air are between 5 per cent and 11.5 per cent of gas. Similarly, the explosive limits for mixtures of gasoline vapor and air lie approximately between 1 and 4/10 per cent and 6 per cent of gasoline vapor.

When the size and weight of petroleum molecules increase, the boiling point is raised. In other words, the higher the molecular weight the heavier and less volatile is the material. Furthermore, as the volatility of these hydrocarbons decreases the limits for their explosive mixtures with air, below which nothing happens and above which there is a burning rather than an explosion, come closer and closer together.

Consequently, as we go from lighter petroleum products, such as gasoline, to heavier petroleum products, such as kerosene, and up to materials boiling above 400 deg. F., the range for explosive mixtures of air and heavy hydrocarbon vapors becomes more and more narrow, until a point is reached where there is a great difficulty in adjusting the mechanical parts of the carbureter so that they deliver the proper explosive mixture. For

example, suppose a mixture of 5 per cent hydrocarbon vapor and 95 per cent of air is the only possible explosive mixture for the vapors of a certain substance, how difficult, if not impossible, it would be to adjust a carbureter to deliver accurately and continuously that exact mixture.

The result then is that when this heavy material, with narrow explosive limits, is used for fuel there is slow burning rather than explosion, and only a part of the combustion occurs in the cylinder where it can be utilized. Therefore, it is questionable whether an efficient carbureter for heavy kerosene can be devised.

Other suggested solutions of the motor-fuel problem involve the use of oil derived from coal, shale, peat and lignite. These will be immensely important sources of liquid fuel in the more remote future. Passing over the large supply of light oil possible from coal now burned without coking, which may amount to as much as a billion gallons of fuel per annum, there are immense shale deposits in America containing a volume of oil many times greater than that now known. Here the problem of obtaining motor spirits from the oil will arise again, and the solution of it, as of our present problem, will necessitate cracking processes.

Then, as now, the demand for motor spirits will run ahead of the supply obtainable by straight distillation, and the logical solution of our present motor-fuel problem will be the logical solution in future problems. The fundamental proposition is that when the demand for gasoline doubles or trebles, while the amount of petroleum remains nearly constant, we must make more gasoline from a given volume of crude oil. The best evidence that this proposition furnishes the answer to our problem is the fact that cracking processes are now solving the problem. In other words, since 20 per cent of our gasoline is now being made by cracking, the price of gasoline would of necessity be much higher without this increased supply.

The chemical phenomena involved in the cracking of heavy oils into lower boiling oils have been discussed in considerable detail in Bulletin No. 114, United States Bureau of Mines. Broadly speaking, and without consideration of relative merits, cracking processes may be classed under the five heads:

- (a) Liquid condition processes wherein oil is cracked as a liquid.
- (b) Gaseous condition processes wherein oil is cracked as a gas.
- (c) Processes wherein cracking is aided through the use of catalyzers.
- (d) Processes wherein the oil is mixed with steam, hydrogen, or other materials.
- (e) Combinations of the above four methods.

The object of the present paper is not to discuss the technical nor the research side of cracking, but to indicate how real is this industrial operation to-day. During the present year, 1917, approximately 600,000,000 gal. of cracked gasoline is being produced in the United States. It is estimated by competent authorities that the production of cracked gasoline in 1918 will be 1,000,000,000 gal., and that by 1920 more gasoline will be produced by cracking than by all other methods. Many people have been disappointed because cracking processes have not reduced the price of gasoline materially, but they have failed to consider their tremendous benefit in keeping the price of gasoline from going to 10 cents a gallon higher. Seven thousand automobiles a day require a cumulative supply of motor fuels. Our crude-oil production is not increasing. Kerosene carbureters, as yet, are not a factor. The entire load is falling on the shoulders of cracked gasoline, and cracked gasoline promises to make light of its load.



# The F O R V M



## Have One Design for Army Trucks

By W. J. P. Moore

The specifications recently issued by the War Department for motor trucks are undoubtedly the most important motor truck specifications ever issued by any government, as under these specifications it is ultimately intended to purchase at one time the largest number of trucks that has ever been contemplated by any government.

The importance of having standards as well as standard specifications cannot be overestimated and it certainly shows how thoroughly this was appreciated by the War Department in that it sought the advice and co-operation of the Society of Automotive Engineers.

The specifications are careful to point out many of the difficulties which have been experienced by the War Department on the Mexican Border with the present standard makes of trucks and are drawn for the purpose of having these defects now corrected by the various makers; and would seem to indicate that considerable change from existing standards would be necessary; so that apparently each builder will now have to offer his motor trucks on a new standard or say as a standard military truck instead of on a standard commercial truck basis.

### Sand Difficulties

One of the greatest difficulties encountered on the Border was apparently that due to sand, owing to the very extensive sand deserts existing in Mexico. Anyway if it is not sand it is mud or dust and whenever you get away from good roads these conditions arise and have to be met whether in Mexico or "somewhere on some other front."

Undoubtedly these conditions in Mexico as regards sand were the most severe that could be found anywhere, but the same conditions, in degree, are found to exist in the European War to-day and the writers in the technical press, notably Mr. Bradley in *THE AUTOMOBILE*, have pointed out many times these difficulties and have told the remedies that have been applied in part to correct them; as for instance protecting the parts by a long underpan.

That the sand and dirt problem is a most serious one is evident from the fact that a dust collector is required to be fitted although no suggestion is made that anything should be done to keep the sand and dust from the carbureter and engine breathers. To be sure a pan under the engine only is mentioned, but this is entirely inadequate and the sand and dust will find their way in unless something beyond this is done. It is usual to take precautions where it is known that an epidemic is threatened or liable to re-occur and it is a trite saying that "an ounce of prevention is worth a pound of cure." On this principle it is essential not to stir up the sand and dust more than possible and to prevent them from getting to the carbureter, not wait until this becomes a chronic condition.

Now it is obvious that the sand that gets to the carbureter must to a great degree be thrown there by the wheels—assuming a single motor truck and no wind this would be the only way, except the sand stirred up the suction of the car and possibly a very small amount through the radiator.

Now this can be practically entirely prevented from reaching the carbureter, etc., by a continuous and tight underpan, which may be made in sections, extending the entire length of the truck. This would thoroughly protect all mechanical parts, from radiator to rear axle. Further the underpan being quite smooth would raise less dust by suction. The action of the sand and dirt must also be very severe on spring shackles, springs, distance rod pins, etc., and it would seem to be very essential to endeavor to protect these parts as well, as it could be quite easily done.

Probably 90 per cent of the sand, dust and dirt stirred up by the present form of motor truck spoke wheel with its wide felloe band, on the inside of which the sand collects and runs around like a squirrel in a rotary cage until chance or a favorable wind removes it, can be prevented.

The Egyptians solved this problem thousands of years ago by the plain disk cart wheel which they adopted for use on their vast sand deserts and this same type of wheel is still used by the Mexicans on their sand deserts. This disk wheel will go over the sand with the least possible amount of disturbance and leave practically all the sand on the ground.

### Disk Wheel Effective

The disk type of truck wheel (which type Mr. Bradley shows in his recent article in *THE AUTOMOBILE* is used on about one-third of the Italian trucks) with its wide rim, would be equally effective and also when run into a mud hole would come out practically clean; and further would require less power to drive it as the mud could not suck in around the felloe band and load upon it as in the present form of spoke wheel.

The necessity for the prevention of dust raising and the protection of these parts from any dust raised is of first importance. If the problem had to deal with only one truck this probably of itself would be a satisfactory solution. When, however, these trucks are run in squadrons the amount of dust raised by the preceding trucks somewhat affects the proposition and it is necessary to prevent this dust from entering the radiator of the following cars.

It is obvious that the higher up from the ground the air is taken that passes through the radiator the less sand and dust there will be and a high periscopic tube with swinging top elbow like a chimney draft pipe would be the ideal solution but this would be impractical. It would seem, however, to be quite practical to take the air into the radiator through a backwardly turned or swinging elbow pipe just above the front end of the hood and fitted with a duct leading down to the radiator, and which duct would also in this case serve as the radiator protector mentioned in the specifications.

By this means the heavier particles of dust would pass on and practically clean air only would pass through to the carbureter; or if still found necessary or desirable the ordinary fan could be replaced by a centrifugal extractor which would separate any sand or heavy dust particles, while the clean air only would pass to the carbureter and this current of air within the inclosed pan space would pass out at the rear and prevent any sand laden air being brought into the pan space by eddies or other means.

### Temperature of Jacket Water

Further with an arrangement as suggested above a shutter of the iris or other type could be easily fitted to regulate the amount of air admitted and thus control the temperature of the jacket water. Moreover, with a centrifugal type of extractor fan referred to and a closed duct system a greater amount of air could be sucked through the radiator and therefore a smaller radiator used.

The necessity for an engine speed control is provided for in the specifications but it would certainly be a great advantage to have an automatic magneto spark advance control especially with the inexperienced drivers you are bound to get. No matter how expert a driver may be this spark control is never properly handled and more engines are pounded to death through improper handling of the spark advance than from any other one cause.

An army truck driver requires a machine as automatic as possible, for, even if he has the intelligence to attend to this, however well he may do it he has not the time.

Mr. Bradley in one of his articles in *THE AUTOMOBILE* has pointed out that in Europe on their recent trucks they have even done away with the hand throttle control and rely en-



tirely on the foot accelerator. Now for trucks it would undoubtedly be a very great advantage to do away with all controls on the steering wheel (and for automobiles also for that matter) as it would simplify greatly the control levers, etc., and reduce the number of parts. With an automatic magneto advance this could therefore be easily accomplished and would relieve the driver from the constant manipulation of the spark, a function that can only be properly accomplished when done mechanically and automatically.

#### Standard and Interchangeable Designs

The necessity and importance of a standard design has been pointed out recently in H. D. Church's paper before the Cleveland Section of the Society of Automotive Engineers on military trucks; by Mr. Clayden's articles in THE AUTOMOBILE on military truck drivers, as well as all of Mr. Bradley's papers on European Military Truck Experience. In fact it is universally admitted, but an examination of these specifications shows that there are just two items in the whole truck equipment that are standardized and interchangeable if the trucks are built on the lines laid out by these specifications. These two items are magneto and tires.

There are more than 200 different truck makers in the United States and it is probable at least 100 of these will bid on these specifications and in view of the great number of trucks required, 40,000, it will be necessary to distribute this work among a greater or less number of these. A wide distribution of this order would seem to be essential as a matter of governmental policy so as to avoid showing preference; and secondly and more important on account of time; for even on the basis of uniform distribution this would make an average of 400 trucks per maker, but as of course the order must be divided in proportion to output capacity, many of the makers would receive a much larger proportion.

Whatever this ratio may be is of little relative importance but the really important result is we shall have 200 different standards instead of two standards (there being two sizes of trucks) offered and presumably accepted by the War Department and all based on the recommendations made by the Society of Automotive Engineers.

The bids made by the various makers will undoubtedly all comply with the specifications and thoroughly solve the many points raised; possibly any or all of these trucks would efficiently perform the services required of them. While as working machines there might be only slight differences in their efficiency and no criticism could be made against any machine individually there is a broader principle involved and nothing could justify the employment of 200 different standards except it was contemplated to carry on 100 different wars in 100 widely separated fields of operation.

It will certainly not be disadvantageous to the War Department to receive the proposed bids and thoroughly digest and consider the various suggestions made by the bidders as undoubtedly much information will be gained; and although a further revision might entail some hardships on the bidders nevertheless a revision would seem to be the only practical way.

When we consider that there are over 1000 individual parts in a truck if we have 100 standards this means 100,000 individual parts instead of 1000 and if you have two sizes of trucks 200,000 parts instead of 2000.

There is every reason why the 1½-ton and 3-ton military truck should be absolutely standard and interchangeable to the last detail and to follow any other course will be ultimately severely criticised by the general public and the responsibility for this procedure will fall not on the War Department but on the consultant engineers, the Society of Automotive Engineers.

A composite of all the bids submitted would be one way to do this or a complete new design made up by the consultant engineers, and the work distributed among all the truck makers in proportion to their capacities and as might be outlined by the engineers after consulting with the truck makers. The fact that certain patents enter into the makes of some of the trucks has no bearing as the govern-

ment can use them anyway and can arrange compensation or can commandeer all the required works.

Aside from the great necessity and advantages of standard military trucks the fact must not be overlooked that such a step will effect a considerable saving in first cost—which would not be less than 10 to 20 per cent or say from \$15,000,000 to \$30,000,000.

## Wants Hotchkiss Drive Information

By Everett P. Ladbroke

I MUST congratulate THE AUTOMOBILE on its excellent reviews of the new cars and the new models introduced by established makers.

One feature of the prevailing design has both interested and puzzled me, and my object in writing you is to seek from you or from one of your readers some enlightenment. I allude to the present vogue for the so-called Hotchkiss type of drive. From a mechanical standpoint, I see little to commend it. That this system must greatly handicap the springs in their primary function as shock absorbers, by having to resist a powerful turning force, is only a matter of clear reasoning and that the wear and tear on universal joints is great, owing to the changing relative positions of propelling shaft to pinion bearing.

As an illustration, one has only to watch the movements, perhaps contortions would be a better term, of a rear axle on a car fitted with the Hotchkiss type of drive, when ascending an incline and a change of gear is being made, to realize the severe tax on springs, bearings and universal joints. Perhaps it would be fair to note that the Hotchkiss drive seems more popular with those makers who manufacture their cars from well known components. From this observation it would appear that the various components when assembled together do not readily adapt themselves to any provision for taking the torque or the propulsion forces other than through the springs, but I do not think that can be the only explanation for the present wide and general adaptation of the Hotchkiss drive.

## Formula Measures Ability of Engines

By C. C. Hinkley

Chief Engineer of Chalmers Motor Co.

I am afraid I am going to be unable to give you any assistance in the way of ability or activity formulae that would be suitable for the purpose, inasmuch as my formula is so full of holes it would never stand the searching investigation of a trained mind. I will give you what I have, however, that you may look it over and criticize it, if you will.

This formula was evolved from the old Franklin ability formula; but I have taken the liberty of changing the factor of horsepower for displacement factor, which I find is a more tangible factor than the original horsepower factor in the Franklin formula. I assume all activity or ability should be figured on a basis of the valve-in-the-head engine, at 100 per cent; and an L-head engine should develop 90 per cent of a good valve-in-the-head engine. Consequently, my formula reads as follows:

$$\text{cu. in. x gear ratio x 0.9}$$

$$\text{total car weight x wheel diameter in in.}$$

For the T-head engine, substitute 0.8 for the factor 0.9 in the above formula.

COMPARISONS OF ABILITY OF VARIOUS ENGINES

Chalmers	Piston Dis.	Pass.	Loaded Weight	Gear Ratio	Wheel Dia.	Type Engine	Ability Factor
Model 24, 4 x 5½, 6-cyl.	414.7	5	5000	3¾:1	36	T-Head	.00695
Model 26-A, 3½ x 5½, 6-cyl.	317.5	5	4600	4:1	34	T-Head	.00645
Model 32-A, 3½ x 5, 6-cyl.	230	5	3800	4.46:1	34	Valve-Head	.00795
Model 32-B, 3½ x 5, 6-cyl.	230	7	4385	5¼:1	34	Valve-Head	.00810
Model 35-A, 3½ x 4½, 6-cyl.	224	5	3650	4¾:1	32	L-Head	.00820
Model 35-B, 3½ x 4½, 6-cyl.	224	7	4310	5.18:1	34	L-Head	.00715
Ford, 3¾ x 4, 4-cyl.	176	5	2600	3.63:1	30	L-Head	.0074
Saxon, 2.78 x 4½, 6-cyl.	175	5	3250	4¾:1	32	L-Head	.0072
Buick, 3¼ x 4½, 6-cyl.	224	5	3700	4:1	34	Valve-Head	.00710
Dodge, 3¾ x 4½, 4-cyl.	212	5	3000	3.61:1	32	L-Head	.00715
Dort, 3¼ x 5, 4-cyl.	166	5	2900	4.1:1	30	L-Head	.00570
Oakland, 2 13/16 x 4¾, 6-cyl.	177	5	3100	4¼:1	32	Valve-Head	.00780
Maxwell, 3¾ x 4½, 4-cyl.	185	5	2900	3.58:1	30	L-Head	.00685
Cadillac, 3¾ x 5¾, 8-cyl.	314½	7	5170	5 1/14:1	36	L-Head	.00775

I have worked these out on a basis of the engines built by this company since 1912, embracing all of the various types mentioned, and I find that they will perform relatively true on the road.

To show you how this formula can be picked apart—in the first place, it is only relative and compares one car against the other, which after all is about all I need in my particular work as I always have a car as a basis of comparison to consider when designing. In other words, I set a goal which I wish to reach and work toward it. Displacement in cu. in. means nothing unless something is known of the capability of the engine to transform fuel into energy; and, consequently, the thermal ability of the engine can be inserted into the formula in the form of a factor, .15, .20 or .25, as the case may be.

Again, I am not at all of the opinion that activity will vary directly with the total car weight. I do not believe that doubling the weight is going to halve the activity by any means, nor do I believe that doubling the wheel diameter will halve the activity. Consequently, I wish to assure you that this formula is only good for comparative purposes of one car against the other.

The attached sheet is a list of the relative comparisons that could be made, of which I have a record, and I assure you that the activity formula bears out the performance of the car very closely.

## Change Oil in Truck Engines Frequently

By E. R. Burley

*Superintendent Lamson Truck and Tractor Co.*

WE note with pleasure an article by H. L. Horning of the Waukesha Motor Co. in regard to the nature of the fluid found in the crankcases of motors after various periods of use. This entirely corresponds with the writer's experience in the matter and we think the subject should be given widespread publicity, not only by automobile magazines, but by manufacturers and distributors, particularly of motor trucks.

The average motor truck owner thinks he is doing well if he changes the oil in his engine every 3 months. He thinks it quite unnecessary to do it oftener, although we try to pound the necessity into his head. The best way to prove to these men just how serious the matter is, is to drain a small quan-

tity of oil from the crankcase, when the odor will convince them very strongly of the proportion of gasoline mixed with the oil.

We think matters as important as those handled in this article appear entirely too rarely in our trade journals and are glad to see that a start is being made toward helping the automobile and motor truck operators obtain greater efficiency from their vehicles.

## Better Brake Suggestions

By J. Edgar Finn

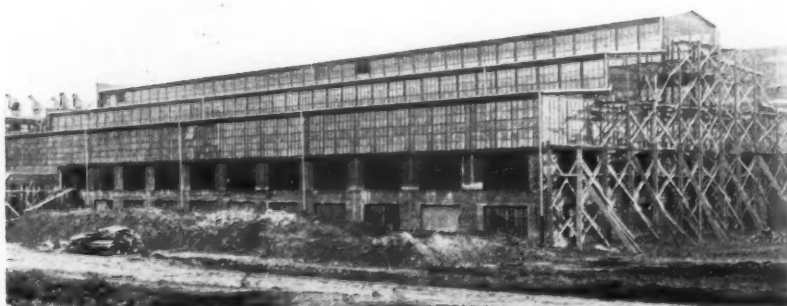
WHY have we not more efficient braking systems? There is no doubt in my mind but what engineers have neglected this important part of the automobile. It is high time that it were given the consideration it deserves.

How annoying it is to see a fine car traveling along smoothly and to have the silence of its operation broken by noisy brake bands and rods! How ridiculous to see a driver push and strain on a brake pedal to bring his car to a halt! This is often the case on practically new cars, cars that have only been run a few hundred miles. Whose fault is this? Think it over.

As for their construction, why should engineers either object or neglect to inclose from the weather (which we know is very harmful to all mechanism) such an important part of the car as the braking system. Considering the different designs and types of brakes carefully, why not the internal expanding propeller shaft emergency brake and the rear axle foot or service brake expanding type combination? It would certainly give an efficient and less complicated arrangement. It would permit the widening of the rear axle service brake drums materially, thereby increasing the power and life of the brake, and the slight increase in weight would be compensated for by the added efficiency. Brakes, being of the internal expanding type and therefore easily inclosed, it would be a simple matter to provide lubrication for the wearing surface, in this way eliminating noise from undue wear.

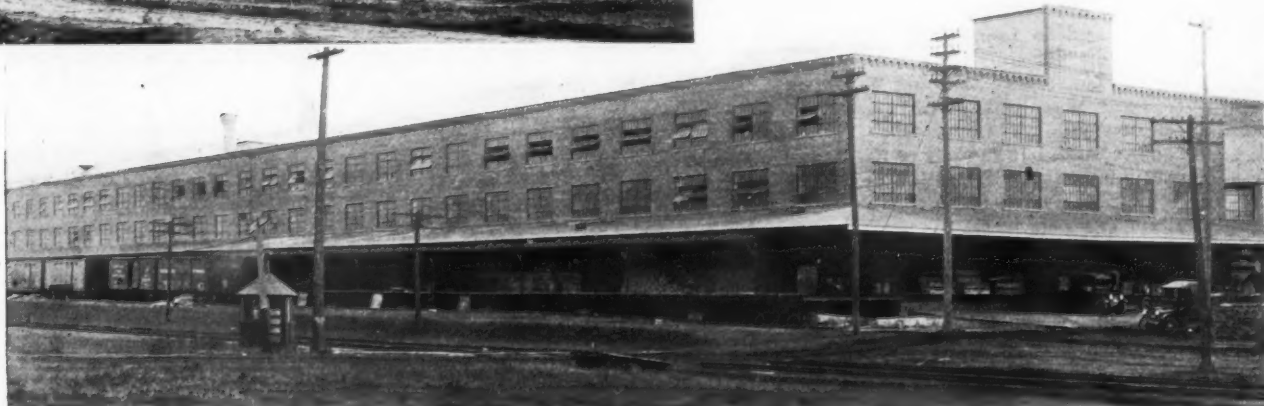
As for the emergency of the propeller shaft internal expanding type, nothing could be more efficient, being not only protected from the weather, but very accessible for adjustment and repair, and considering the brake power is plus the ratio reduction in the rear axle, we have here a decided mechanical advantage without complication. That is hard or practically impossible to obtain otherwise.

## Two Recent Additions to Reo Plant



Left—The heat treating plant Reo is erecting at a cost of \$50,000. This building will be 98 ft. by 224 ft. and constructed principally of steel and glass

Below—The new receiving building completed at the Reo plant at Lansing. The building is 198 ft. by 630 ft.





# Three Berling Magnetos

Single Spark Unit for Automobiles and Trucks — Two-Spark Type for Aeroplanes — Motorcycle Type

THE Ericsson Mfg. Co., Buffalo, N. Y., manufacturer of the Berling magneto, is putting out a line of ignition systems which are rapidly growing as stock equipment for both American and foreign vehicles, as well as for the requirements of aeronautic service. There are three basic types of magneto made by the Ericsson company, all under the name of Berling. These are a single spark unit intended for automobiles and trucks; a two-spark type for high-duty requirements such as aeroplanes and passenger cars; and a motorcycle type.

The Berling type D, two spark, independent, and the type DD, two-spark dual have been designed for heavy-duty four, six, and eight-cylinder models, in which the charge in the cylinder is ignited simultaneously at two separate spark plugs. The capacity of the D and DD types is sufficient to give suitable ignition for motors up to 200 hp. requiring a maximum magneto armature shaft speed of 4000 r.p.m. The eight-cylinder types are designed to run at twice crankshaft speed, the sixes at one-and-one-half times crankshaft speeds, and the fours at crankshaft speed. Magnetos of this type are principally required for marine and aeronautic fields.

A feature of the Berling two-spark magneto is that neither end of the secondary winding is grounded, but each is connected to one of two separate segments on the collector ring.

The distributor mechanism consists of two separate distributor blocks and one distributor finger, carrying two separate distributor brushes, each brush connecting with the segments of its respective distributor block. With this arrange-



Berling E type of magneto partially disassembled

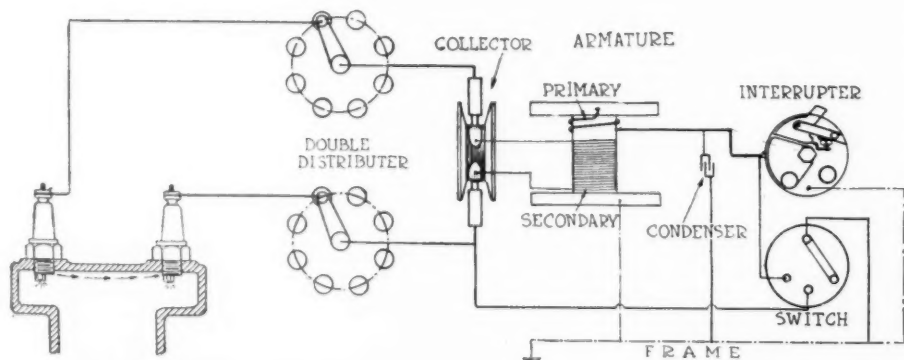
ment any two cable terminals directly opposite each other on the distributor blocks will possess an equal electrical potential. The two sparks are secured by one break in the primary circuit and are simultaneous because, when any two opposite cable terminals are connected to the corresponding pair of plugs in the same cylinder, the high-tension circuit will be closed the moment the spark gaps are bridged, that portion of the cylinder between the two plugs forming part of the electrical circuit. This is shown in the accompanying circuit diagram. This illustration shows diagrammatically the circuit of the two-spark type of independent magneto and the switch used in connection with it. In the off position the primary winding is short-circuited. This independent type of two-spark magneto is similar to that used on a great many of the Curtiss aeroplanes, while the type DD, which is the same magneto arranged with a dual connection, is now employed as regular Locomobile equipment.

The type E Berling magneto is intended for a wide range of purposes, including automobiles, trucks, aeroplanes, and marine fields. It is a high-tension type and a completely inclosed waterproof unit.

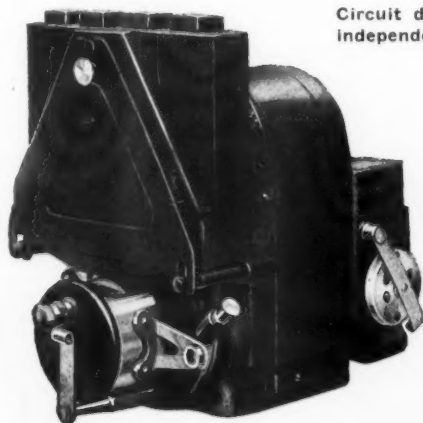
One of the features of the Ericsson magneto is its accessibility. The distributor can be removed by unsnapping the two holding springs on the end. The interrupter is adjusted by loosening an ordinary screw locking the platinum contact in place. The action of the interrupter can be inspected while the magneto is running. The collector brush holder can be removed by taking out two screws holding the upper portion of the driving end.

The Berling ED type is similar to the E except that it is a dual design and has in addition a battery interrupter and terminals provided for connection to a combined coil and switch of the dash type. The dual type is particularly adapted for trucks where two sources of ignition supply are desired, and for marine engines where it is difficult to turn the engine over rapidly enough by hand to start on the magneto.

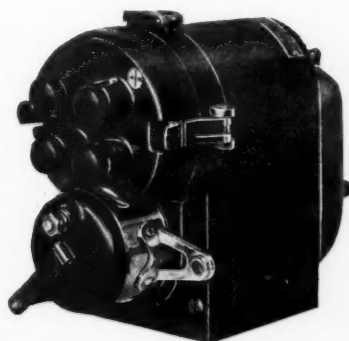
Regarding the construction of the magneto, there is nothing particularly radical, as it is a straight high-tension type and not a departure from what is regarded as conservative practice in any degree. It is solidly constructed, and one of the particularly noticeable features regarding it is that the magnets have a higher retentive than the magnet steels which were formerly imported from the other side, according to tests made at the Ericsson factory.



Circuit diagram of the Berling D type two-spark, independent magneto. This is used in Curtiss aeroplanes



Berling D-81 magneto used by Curtiss



High-tension waterproof type E

# Uses of Water Injection

## Moisture in the Cylinder Alters Indicator Diagram— Tends to Reduce Carbon—Experiments Easily Made

By Charles E. Manierre

**T**HE introduction of a certain amount of water into gas engine cylinders has its advantages. But there is an erroneous idea in some quarters that it produces power in the sense that gasoline does. It may be that this grows out of the fact that so-called water gas is furnished for the illumination of houses.

In the production of water gas, at a certain stage in its manufacture, steam is blown up through the burning coal, releasing the hydrogen from the water while the oxygen combines with the carbon of the coal to form carbon monoxide. The hydrogen is then ready to combine with the oxygen of the air and the carbon monoxide is ready to combine with the oxygen of the air, both of which combinations take place only at the time of the burning at the gas jet.

There is no free oxygen in the gas composition. Incidentally, for the purpose of causing it to burn with a bright flame, it is enriched with oil so as to have a considerable percentage of  $\text{CH}_4$  and  $\text{C}_2\text{H}_6$ . The gas also has traces of  $\text{CO}_2$  and contains, of course, a fair percentage of inert nitrogen gas.

### Terms Differentiated

In the making of producer gas the same operation takes place. To prevent confusion it should be emphasized that so-called water gas is coal gas treated with a percentage of water. The term unfortunately is also correct if used with regard to water vapor, in the same way oxygen gas or chlorine gas is spoken of. However, the accepted term for real water gas is aqueous or water vapor, an invisible, dry gas, which only becomes visible when part of it is turned into minute drops of water, forming the vapory cloud which is somewhat inaccurately known as steam.

The mere heating of water to the point of its dissociation, or in other words, the breaking up of the water molecules into atoms, does not produce a burnable gas. In fact, the point of dissociation is no point at all but a progressive reduction of the water as the heat increases, beginning at 1200 deg. C., and as the heat increases up to 2500 deg. C. an increasing percentage of the water is affected until it is complete at 2500 deg. C. As the temperature falls the water gradually reforms until at 1200 deg. C. it is again all water.

It is quite true that oxygen gas and hydrogen gas in a cool state may mix together and may remain so for a time, requiring a spark to cause their chemical combination. But a temperature of 1200 deg. C. is far above that necessary to cause them to combine. Moreover, being (when dissociated) in the atomic state, they have a greater tendency to combine.

The utter impossibility of either producing or maintaining the least of those temperatures outside of the cylinder is apparent when it is considered that a red heat just visible is 500 deg. C., that copper melts at 1083 deg. C., that cast iron melts at about 1200 deg. C., mild steel at about 1300 deg. C., wrought iron at about 1600 deg. C., and the extreme heat of the Bunsen burner is only 1550 deg. C., while copper boils at 2310 deg. C.

### Steam Affected by Heat of Explosion

There remains then to be considered the case where water or steam is drawn into the cylinder and affected by the heat of the explosion. Here it is certainly within the probability that in the center of the mass in the explosion chamber temperatures are reached at which the water vapor is dissociated. It must be remembered, however, that in the cylinder at the time of the explosion the pressure is increased several atmospheres and this would have the effect of increasing materially the temperature range within which dissociation takes place.

It then, in all probability, has three good characteristics.

One volume of the vapor dissociated occupies a volume and a half of space. In other words, it tends to increase the pressure slightly while on the other hand it absorbs enough heat units to materially decrease the pressure within the cylinder until the temperature of the cylinder falls to the point where it can recombine, whereupon it gives out the same heat units which it had absorbed and increases to that extent the pressure. In other words, the presence of the water vapor has taken off the extreme momentary pressure and spread it out more evenly.

Whether this would be an advantage in a high speed racing car may be a question, but in ordinary uses it would be somewhat advantageous, and particularly with four-cylinder engines, a considerable advantage in securing smooth running, although as to power it is directly opposed to the idea of igniting the charge at two different points to obtain a quicker burning.

It ought to be said that the foregoing theory of dissociation occurring in the cylinder is only a theory and is not to be too much relied upon.

Experiment has abundantly shown that the introduction of water vapor tends strongly to prevent the formation of carbon deposit and even to clear away the deposit already formed. Just how this is done is a question. It may be that part of the free hydrogen does not recombine with the identical oxygen atoms with which it had been in combination but combines with the oxygen of the air. The oxygen set free by the water, being in single atoms and therefore in what is sometimes known as the nascent state and more active than ordinary oxygen, is capable of seizing upon the carbon scale to form carbon monoxide or carbon dioxide.

### Water in Cylinder Reduces Temperature

In this connection and for the sake of clearness, it ought to be said that a molecule of oxygen consists of two oxygen atoms. The single atoms tend to come together to form such molecule, but when they are released from other combinations there is a moment when they are separate atoms and are ready to attack other elements in a manner which they show no tendency of doing when they are combined in the molecule. An example of this is peroxide of hydrogen, the formula of which is  $\text{H}_2\text{O}_2$ . The extra O is not wanted very much in the combination and is only too ready to escape. In fact the bottle being uncorked one finds a pressure from the already separate oxygen gas. Its activity when applied to a wound or infected spot is actually a burning up or combination of this free oxygen atom with the bacteria.

It is easy to see, therefore, how little chance carbon would have to form if it is finely divided and in the body of the exploded charge.

The third advantage of a percentage of water in the cylinder is to reduce the temperature and thus prevent knocking. For this purpose the water would seem to be better introduced in the form of fine drops. It is an exceedingly common and sometimes necessary expedient in the burning of kerosene as a fuel. Some engines of comparatively high pressure cannot use the kerosene without this expedient.

Experiments have been carried so far as to attempt to do away with the radiator and cooling water, by the introduction of large quantities of water into the explosion chamber. As a last resort in an emergency where an accident had prevented the use of cooling water this use of water might be experimented with. It might enable the driver to cover the short distance which might seem an absolute necessity, thus saving the seizing of the piston.

Various attachments are on the market, intended to furnish a supply of either steam, water spray or moist air. The ob-



jection to water spray entering the intake manifold is the resulting reduction in temperature of the mixture due to the evaporation of the water. Steam entering the manifold is not open to this objection. If the steam enters the main air supply of the carburetor and the air supply is suitably heated, the resulting moist air is then delivered by the carburetor.

The amount of water vapor necessary to keep the engine free of carbon is a matter for experiment. No more of it should be used than is necessary for any of the purposes already mentioned, as the vapor displaces just so much air, and, theoretically at least, reduces the energy possible to be obtained from the displacement volume of the cylinders.

#### Maintenance of High Temperature

One end to be sought is the maintenance of a high temperature in the manifold, which may with advantage range up to about 300 deg. F., thus taking care of even straight kerosene carburetion.

There are on the market several devices originally intended as priming reservoirs. Some of these are provided with needle valves and could be well used in home experiments, being filled with water and a pipe from them taken against or in one or more turns around the exhaust pipe and so to the manifold.

For one who wishes to construct his own experimental outfit, there is to be had a so-called motorcycle sight feed valve, weighing 3 ounces and 2½ or 3 in. long, which is sold for something under \$1. Each end is threaded for ¼ in. pipe size, type F having two ends at right angles and type N being a straight pattern. There is a check valve at the bottom, a glass sight tube and an adjustable needle valve. These can be had from the Lunkenheimer Co., Cincinnati, Ohio. The accompanying fittings would be for the usual copper tubing, flared or soldered, and of such size as the experimenter might choose.

Some years ago it was generally noted by automobile drivers that after sunset the engine seemed to exhibit increased power. This in part was doubtless due to the cooler air permitting a larger amount of oxygen to a given volume, but it may have been due also in part to an increased humidity. However, the apparent increase in humidity may not have been an absolute increase in the quantity of moisture in a given volume of air. The cooling of the air as night came on would of itself make manifest the humidity which before that would not have been noticeable, although the same quantity of water was present.

To pursue the matter of combustion a little further, it may be said that gasoline, kerosene, benzine and paraffine wax are only some of a series of products made up of carbon and hydrogen atoms becoming progressively more complex in the molecule as the body changes its character from the volatile ether to the wax-like paraffine.

Ordinary gasoline consists of half a dozen or more distinct bodies with boiling points ranging far above and considerably under the boiling point of water. It is this series of boiling points maintained by the different parts of the mixture which make carburetion so difficult.

However, there is, or should be, nothing but carbon and hydrogen in the fuel. All of the hydrogen invariably combines with oxygen of the air when the explosion takes place in the cylinder and leaves the exhaust pipe in the form of water vapor.

A gallon of gasoline being burned actually produces considerably more than a gallon of water. The carbon combines with the oxygen of the air to form either carbon monoxide (CO) or carbon dioxide (CO<sub>2</sub>) gas. When the mixture is very rich there is not oxygen enough to go around and carbon monoxide is formed while some of the carbon atoms, being uncombined, leave the exhaust as smoke or are deposited in the cylinder to become scale. The carbon monoxide combination gives out comparatively little heat in its formation. It is capable of further burning, producing with additional oxygen the carbon dioxide.

An engine that is run with an over rich mixture not only wastes the excess of gasoline but the excess actually cuts down the power capacity of what would otherwise be a useful charge, so that the careless driver not only carbonizes his cylinder but debases the working power of the gasoline which he uses, besides wasting the excess gasoline.

The significance of the fact that the carbon and oxygen combine with little heat into carbon monoxide is that it is not the increased space which the combined gases occupy which so much counts for power as the increased heat which tends to expand even such an inert gas as the nitrogen of the air, which enormously increases the space which it would fill under a given pressure. It is, therefore, the loss of heat upon which emphasis is laid.

Finally it may be said that 80 per cent alcohol, containing consequently 20 per cent of water is suitable as a fuel, and alcohol with a much larger proportion of water can be used. Of course, in the case of alcohol as a fuel, water is readily mixed with the fuel. Where water is merely used for a short time as a decarbonizer, it might be well, at least as an experiment, to cut down the gasoline supply at the needle valve to its lowest practical limit.

#### To Prevent Cure-Back Curling

SOME vulcanizers have trouble with cure-back stock curling when making tube repairs. This cannot be avoided, as the action of the gasoline in which the patch is dipped will inevitably cause the cured stock to curl. The secret of this operation is speed. Thrust the patch quickly through the hole and press down with the fingers on the edges until the gasoline evaporates, after which there will be no trouble.—R. D. Cain, Instructor, Goodyear School of Tire Repairing.

#### Brake Equalizer a Non-Skid Factor



TESTS made with a U. S. floating power plant truck to demonstrate its non-skidding qualities are said to have brought out some interesting facts regarding the brake equalizer.

The truck in three trials was brought to a full stop on a street in Cincinnati, the first time, 1, with a 3½-ton load in 19 ft., the second time, 2, with a 4½-ton load in 18 ft., and the third time, 3, empty in 24 ft. On each occasion the truck was halted in less than its own length. An interesting feature, which is clearly illustrated in the photograph by the marks on the right, is the fact that while empty the truck actually hopped along on and off the pavement when the brakes were violently applied. The tests were conducted by E. C. Shumard, chief engineer of the United States Motor Truck Co., Cincinnati.





The first assembly consists of putting the plugs in the bottom of the box, assembling and attaching the connection, attaching the float stanchion, fixing the float in the box, and inserting the nozzle. This unit of 150 is then sent downstairs to be tested for leaking. The boxes are placed on a rack extending across the room, are filled with gasoline, and left for 20 min. The boxes which have passed this test are sent up to the assembling tables for the second assembly, which consists of putting covers on the boxes, inserting gauze in the body, attaching the safety-valve, the spring socket, and the clamp on the body. These units are then passed on to the third section of the tables where they undergo the final assembly which includes the putting in place of the throttle valve, the stop levers, the adjusting screws, and the throttle levers. The carbureters are then ready for the final inspection at the end of the assembly tables.

#### Plant Additions

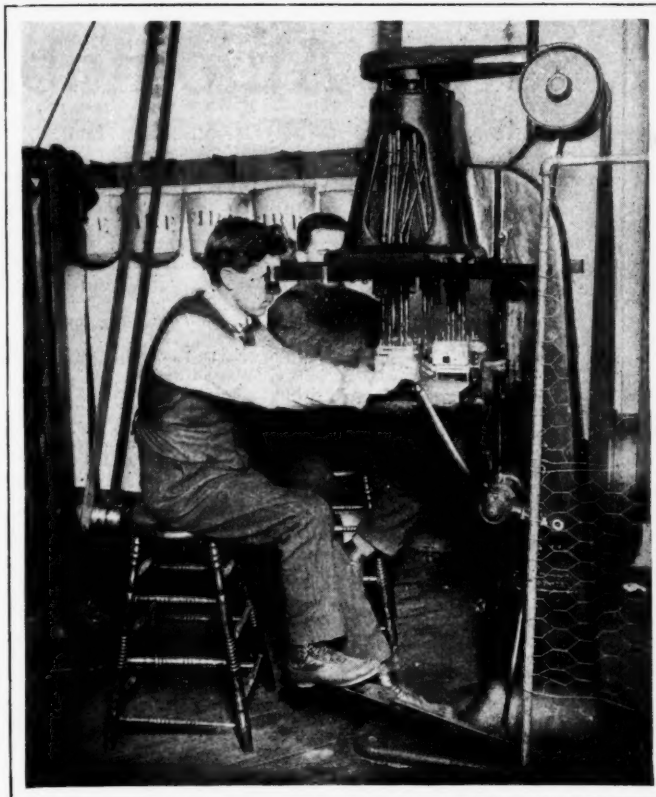
This was the system in operation when the factory was visited by a representative of THE AUTOMOBILE recently. There were then in construction two additions which would add to the facilities of the plant. The first of these was a brass foundry to make the rough castings, and the second the addition of two main assembly tables on the second floor the same size as those already erected.

Three cards are used to check up the work of each man and to keep a constant record of the production costs. Where an employee is working on assembling he receives his parts in 150 unit lots from the stock clerk. On a material card is written the operator and operation, the number and weight of parts, the number and weight of waste parts returned, the number of parts completed, and the time when the work is done. Immediately after this card has been handed in by the operator, the material costs, the waste costs, and the labor for the particular operations involved are figured by the stock clerk and written on the card.

Aside from the material card each worker who is employed by piece work has a daily time ticket. On this is recorded the order number, the operation number, the operator, the date, the piece rate, and work rejected. To the card are attached seven stubs on each of which are written the order, operation, quantity, operator, and date. When the worker has completed any operation in the series, say the first assembly, he detaches the stub for that particular operation, and drops it in the clerk's box. In this way, any one of the executives can see by consulting the stub box what orders are being filled, and how far the work has progressed on each order.

#### Time Cards Provided

For the employees who are working on a time basis there is a daily time and schedule card. This card is ruled horizontally, having one line for every 15 min. during the day. It is ruled vertically to provide columns in which are written the operation number, the order number, and the rate of production. When the employee starts work the order and operation are written on his card on the time line at which he is beginning. When he completes a given operation the



Drilling two carbureter castings at a time on a multiple drilling machine. This machine is equipped with sixteen drills. Note the wire screen guard

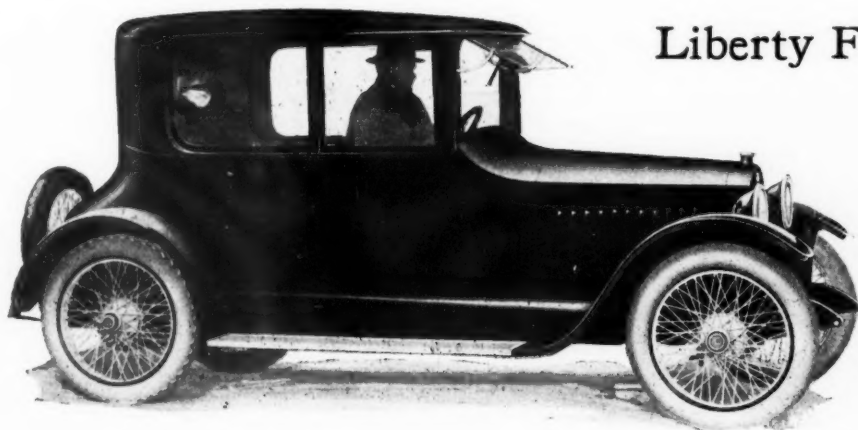
amount of production is recorded, and the new operation is written down on the time line corresponding to the time of day.

#### Productive Hours Indicated

This time-card system which has been in force in the Sundersman factory for a comparatively short period is expected to furnish some interesting data. It shows immediately, of course, the productive ability of any given worker, and the average amount of time required for any one operation. It will indicate also what are the most productive hours of the day, on the average, the relative productivity of night and day work, and the average of increased productiveness on the part of the unskilled worker.

#### Read How

Paige Co-operates with Its Dealers  
On Page 1051



### Liberty Four-Passenger Coupé

THE Liberty Motor Car Co., Detroit, has added a Springfield type of coupé with seating capacity for four passengers, which sells for \$1,795, with five wire wheels at \$90 extra. It is mounted on the standard Liberty chassis and makes an all-season body with glass inclosed sides or open four-passenger roadster as desired.

One of the features of the body, as will be noted from the illustration, are long, double side windows, which permit easy range of vision. The seats are divided in front. The Liberty touring cars and roadster are also equipped with detachable tops if desired.

With the sedan type the price is \$1,395, and with the permanent all-season top, \$1,295.

# Automobile Calendar

## ASSOCIATIONS AND CLUBS

- June 4-6—Hot Springs, Va., National Assn. of Automobile Accessory Jobbers, Convention.  
 Sept. 12-14—Atlantic City, N. J., Motor and Accessory Manufacturers, Mid-Season Meeting.  
 Sept. 25-28—Pittsburgh, National Assn. of Purchasing Agents, Convention.

## CONTESTS

### 1917

- June 16—Chicago, Ill., Speedway Race.  
 June 23—Cincinnati, Ohio, Speedway Race.  
 July 4—Omaha, Neb., Speedway Race, Championship.  
 July 4—Uniontown, Pa., Speedway Race.  
 July 4—Tacoma, Wash., Speedway Race.  
 July 4—Visalia, Cal., Road Race.  
 July 4—Spokane, Wash., Track Race.  
 July 4—Benton Harbor, Mich., Track Race.  
 July 14—Rochester, N. Y., Hillclimb.

- July 15—Missoula, Mont., Track Race.  
 July 17-19—Buffalo, N. Y., Inter-city Reliability.  
 July 22—Anaconda, Mont., Track Race.  
 July 29—Great Falls, Mont., Track Race.  
 Aug. 5—Billings, Mont., Track Race.  
 Aug. 17—Flemington, N. J., Track Race.  
 Sept. 3—Uniontown, Pa., Speedway Race.  
 Sept. 3—Cincinnati, O., Speedway Race, Championship.  
 Sept. 6—Red Bank, N. J., Track Race.  
 Sept. 8—Hillclimb, Pike's Peak, for stripped stock chassis.  
 Sept. 15—Providence, R. I., Speedway Race, Championship.  
 Sept. 22—Allentown, Pa., Track Race.  
 Sept. 28—Trenton, N. J., Track Race.  
 Sept. 29—New York Speedway Race, Championship.  
 Oct. 6—Danbury, Conn., Track Race.

- Oct. 6—Uniontown, Pa., Speedway Race.  
 Oct. 13—Richmond, Va., Track Race.  
 Oct. 13—Chicago Speedway Race, Championship.  
 Oct. 27—New York Speedway Race.

## SHOWS

- June 20-27—Montreal, Que., Used Car Show, Coliseum, Montreal Automobile Trade Assn.  
 Aug. 6-10—Fremont, Neb., General Tractor Demonstration.  
 Sept. 2-9—Spokane, Wash., Interstate Fair.  
 Sept. 9-15—Milwaukee Show, State Park Fair, West Allis.  
 Sept. 9-15—Milwaukee, Wis., Fall Show, Wisconsin State Fair, West Allis, Milwaukee Automobile Dealers.  
 Oct. 13-28—Dallas, Tex., Dallas Automobile & Accessory Dealers' Assn. State Fair.

## S. A. E. Calendar

### Midsummer Meeting

June 25-26—Washington, D. C.

### Standard Division Meetings

#### JUNE

- 1—Miscellaneous, Chicago.  
 6—Starting Battery, Detroit.  
 7—Engine, Detroit.  
 8—Lighting in joint session with a committee from the Illum. Eng. Soc., New York.  
 8—Transmission, Detroit.  
 14—Electric Vehicle, New York.  
 25—Standards Committee, Washington.

### Section Meetings

#### JUNE

- 1—Mid-West, Chicago Automobile Club. A paper on aviation engines by J. G. Vincent.  
 15—Cleveland. Paper by E. H. Sherbondy of the Peerless Motor Car Co. entitled "Aviation Engines, with Particular Reference to the Benz and Mercedes Types."

## Engineering Calendar

American Railway Master Mechanics' Assn.  
 American Institute of Electrical Engineers.  
 Master Builders' Assn.  
 American Society of Heating and Ventilating Engineers.  
 Association Iron and Steel Electrical Engineers.  
 Mining and Metallurgical Society of America.  
 Society of Automotive Engineers.

Illuminating Engineering Society.  
 National Electric Light Assn.  
 National Gas Engine Assn.  
 American Society for Testing Materials.  
 American Institute of Metals.  
 American Foundrymen's Assn.  
 Society Naval Architects and Marine Engineers.

### JUNE

- 2—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.  
 6-7—Nat. Gas Engine Assn. annual convention at Chicago (Sherman House).  
 8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.  
 9—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.  
 11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.  
 11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Michigan section at Detroit.  
 12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.  
 13-14-15—Amer. Ry. Master Mech. Assn. convention, Greek Temple, Atlantic City, N. J., Hdqrs. Marlborough-Blenheim Hotel.  
 14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.  
 15—Illum. Eng. Soc. Pittsburgh section, Office Building, Lighting and Inspection Trip through City and County Building, Mr. S. G. Hibben.  
 16—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.  
 18-19-20—Master Car Bldrs. Assn. convention, Greek Temple, Atlantic City, N. J., Hdqrs. Marlborough-Blenheim Hotel.  
 20-22—Amer. Inst. Chem. Engrs., Ninth Semi-Annual Meeting at Buffalo.  
 21—Mining & Met. Soc. of Amer. New York section monthly meeting at Engrs. Club.  
 26-30—Amer. Soc. for Test Mat. annual meeting Atlantic City, Hotel Traymore. Business meetings, reception and golf tournament.

### JULY

- 7—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.

- 9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.  
 9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.  
 10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.  
 12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.  
 13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.  
 14—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.  
 16—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.  
 21—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

### AUGUST

- 4—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.  
 9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.  
 10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.  
 11—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.  
 13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.  
 13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.  
 14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.  
 20—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.  
 21—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

### SEPTEMBER

- 1—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.  
 8—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

- 10-14—Assn. Iron & Steel Elec. Engrs. annual convention at Phila.  
 10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.  
 10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.  
 11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.  
 13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.  
 14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.  
 15—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.  
 17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.  
 20—Mining & Met. Soc. of Amer. monthly meeting N. Y. section at Engrs. Club.  
 24—Amer. Inst. Metals at Boston.  
 24—Amer. Fdry. Assn. annual meeting at Boston.

### OCTOBER

- 6—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.  
 8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.  
 9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.  
 10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.  
 11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.  
 13—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.  
 15—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.  
 17-18-19—Amer. Gas. Inst. at Washington, D. C.  
 18—Mining & Met. Soc. Amer. monthly meeting New York section Engrs. Club.  
 20—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

### NOVEMBER

- 3—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.  
 8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penna. section at Phila.  
 9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.  
 10—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.  
 12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.  
 12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.  
 13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.  
 15—Mining & Met. Soc. Amer. monthly meeting New York section at Engrs. Club.  
 15-16—Soc. Naval Arch. & Marine Engrs. annual meeting.  
 17—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.  
 19—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

### DECEMBER

- 1—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.  
 8—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.  
 10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.  
 11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.  
 13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.  
 14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.  
 15—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.  
 17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.  
 20—Mining & Met. Soc. Amer. monthly meeting New York section at Engrs. Club.